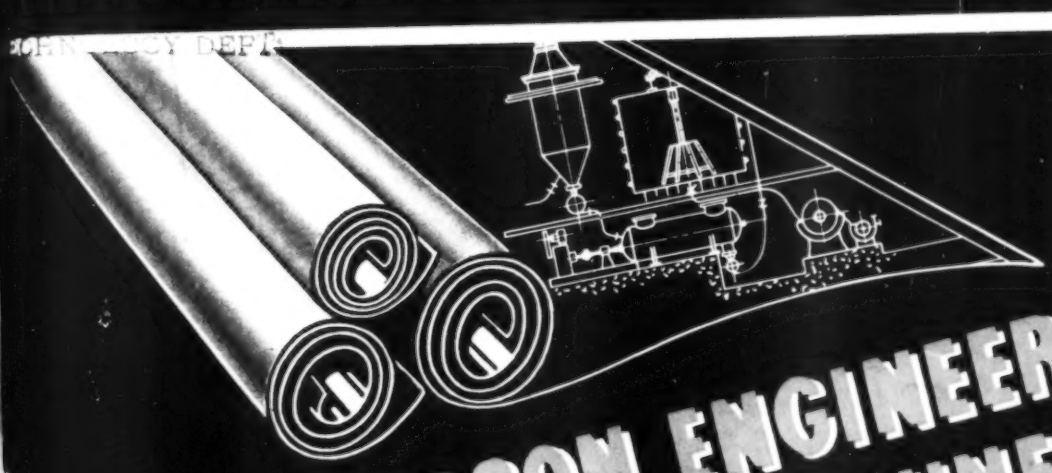
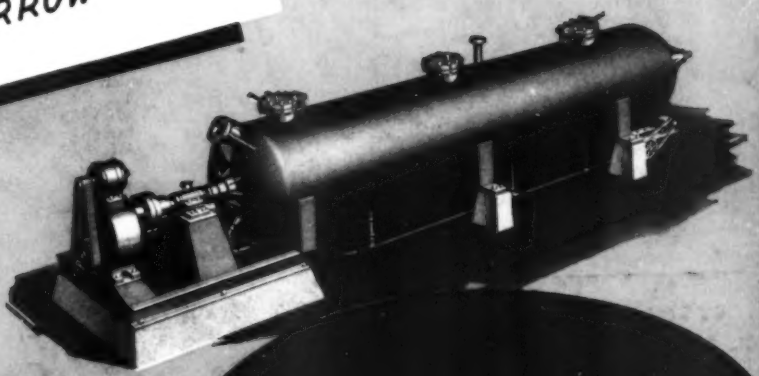
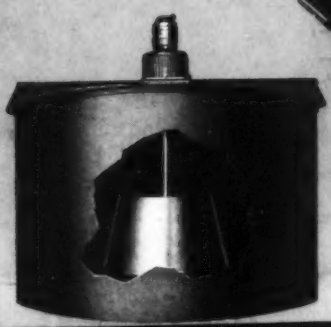
THE PAPER INDUSTRY and PAPER WORLD



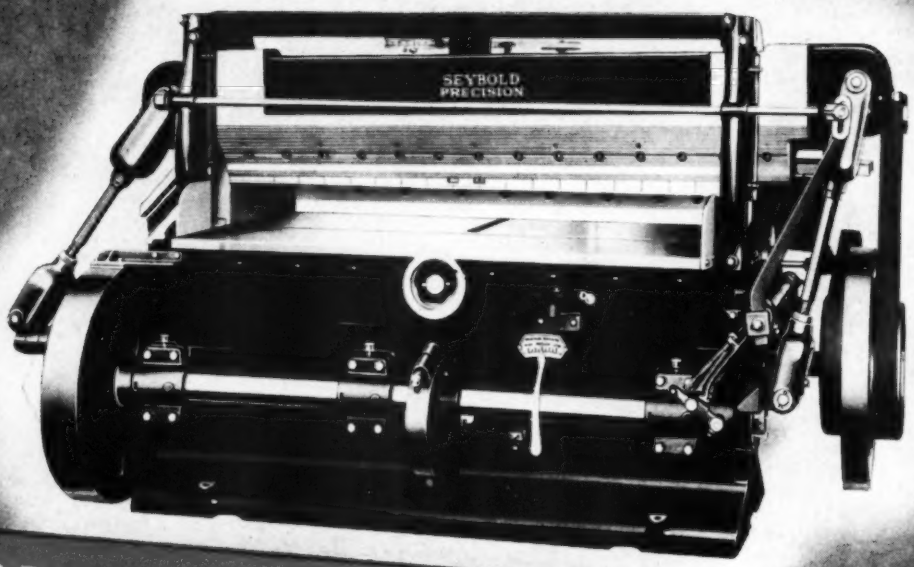
Let PATTERSON ENGINEERING and PATTERSON MACHINERY

COMBINE FOR POST-WAR PROFIT IN YOUR "PLANT OF TOMORROW"





THE PATTERSON FOUNDRY and MACHINE CO.
EAST LIVERPOOL, OHIO, U. S. A.

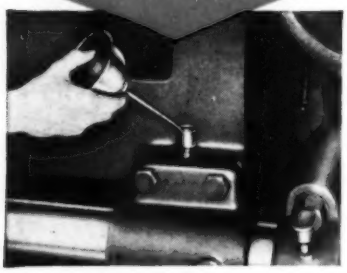


HOW TO KEEP IT IN TRIM!

Your Seybold Machine, like all fine precision equipment, needs regular preventive maintenance to keep it operating smoothly and without interruption . . .

EACH DAY do this:

Lubricate the drive shaft bearings, clutch and other moving parts. Clean dust, lint and old grease from operating surfaces. Inspect knife.



EACH WEEK do this:

Check the clutch and brake adjustment.

EACH MONTH do this:

Inspect the clamp pressure mechanism.

NOTE: Should you require repair or maintenance service, call your nearest SEYBOLD REPRESENTATIVE.

SEYBOLD SALES AND SERVICE

New York:
R. P. Lawson & Co., Inc. 426 West 33rd St.
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Chas. N. Stevens Co., Inc. 112 West Harrison St.
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SEYBOLD

• DIVISION •

HARRIS-SEYBOLD-POTTER COMPA

823 WASHINGTON ST., DAYTON 1, OHIO

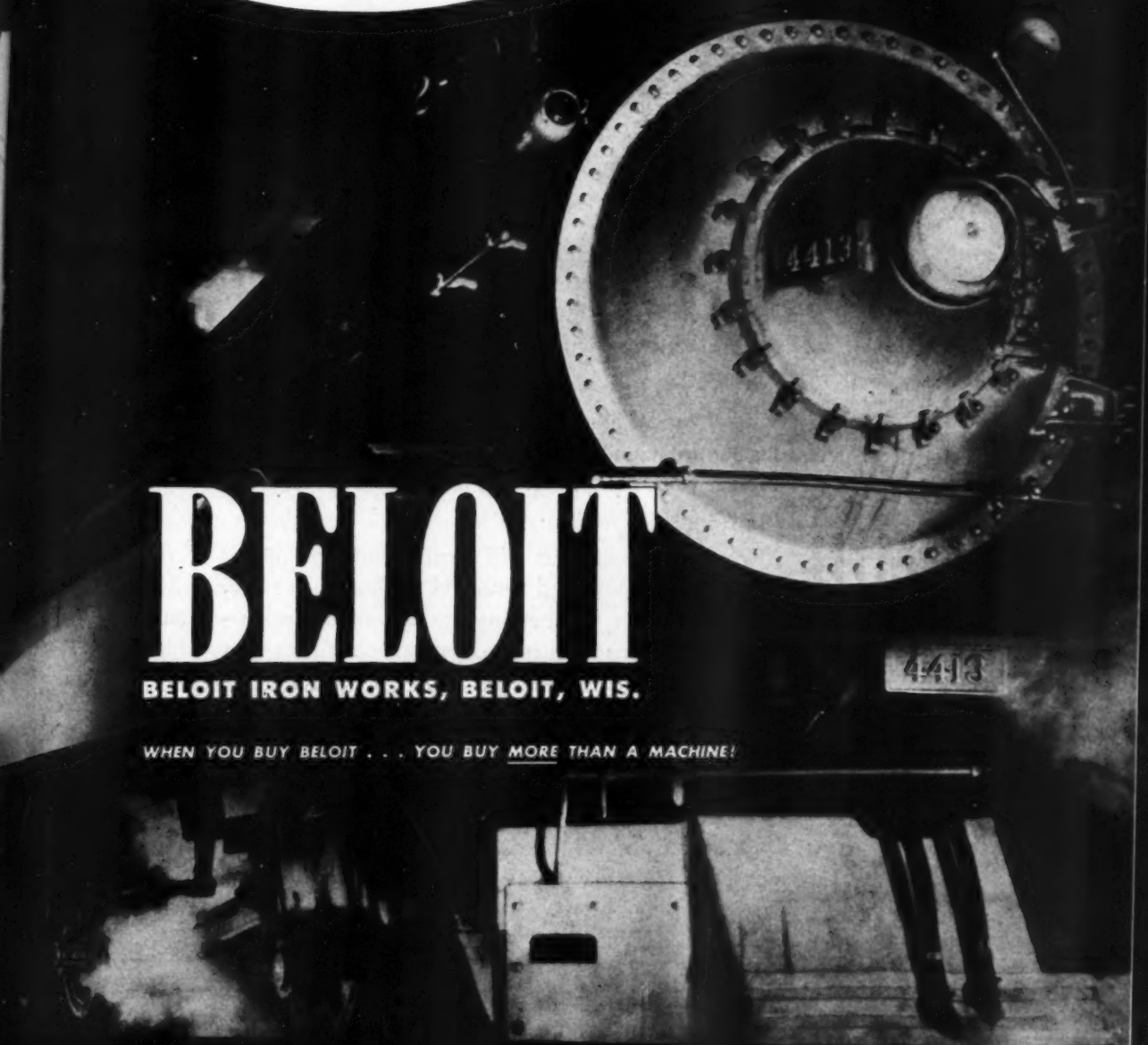
SERVICE IS A WAR JOB, TOO!

When we look back at letters from our customers of four or five years ago, we find such phrases as "excellent service," "quick dispatch," "splendid cooperation." But we have just examined a batch of *recent* letters on the same subject (service) and we find exactly the same expressions of satisfaction and appreciation! Yes, and *the same customers*, too, who've been with us down through the years. Expecting service . . . getting it *fast*.

Buy War Bonds for Victory!

PHOTO, SOUTHERN PACIFIC RAILROAD

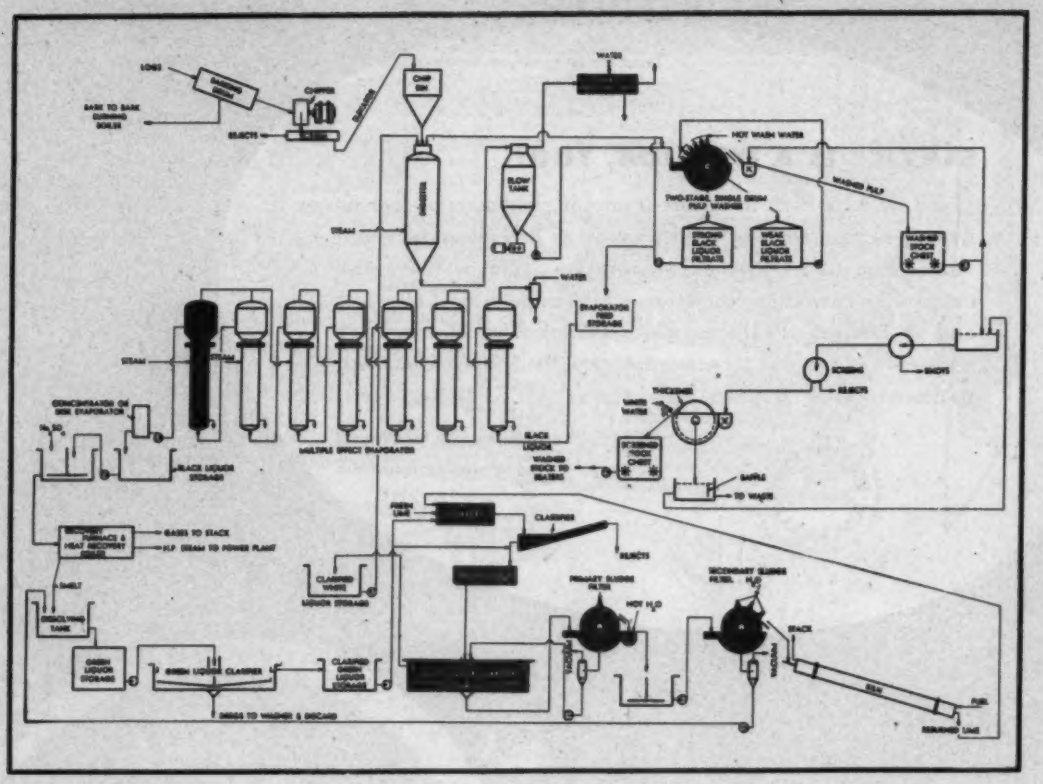
BELOIT IRON WORKS • PAPER MACHINERY • BELOIT WIS., U.S.A. • SERVING UNCLE SAM 1ST FOR THE DURATION •



BELOIT

BELOIT IRON WORKS, BELOIT, WIS.

WHEN YOU BUY BELOIT . . . YOU BUY MORE THAN A MACHINE!



This flow sheet shows Swenson equipment in a typical sulphate mill. Major units include:
Black Liquor Evaporators
Pulp Washers
Lime Sludge Filters
Digester Blow Condensers (heat recovery systems)
Causticizing Equipment

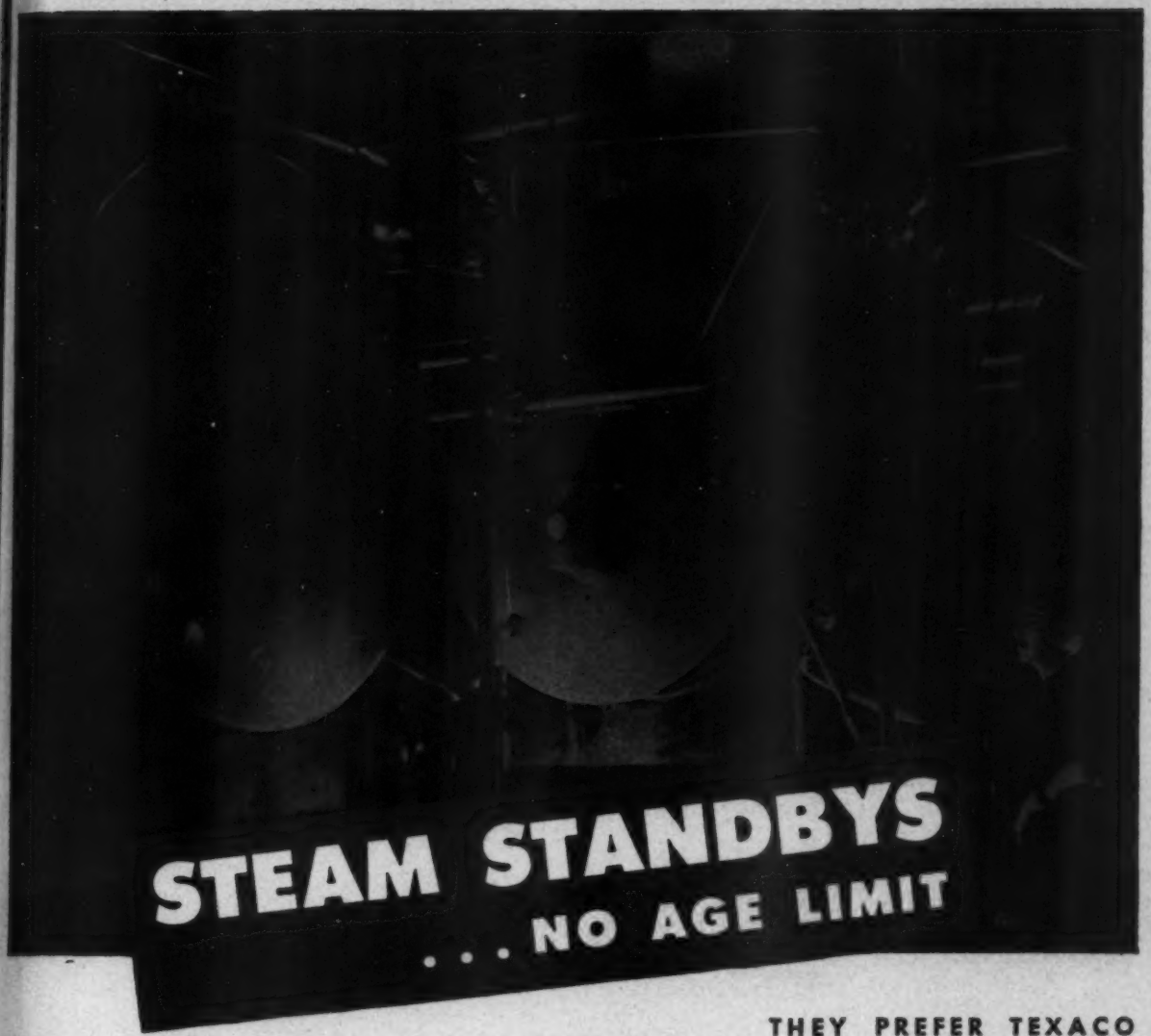
Swenson Pulp Mill Equipment

FOR many years the problems of pulp mill operation have had the careful attention of Swenson engineers. Specially designed Swenson evaporation and filtration equipment has long functioned with high efficiency in numerous mills.

More recently Swenson production has been devoted to vital chemical plants necessary to the war... but the time is fast approaching when pulp and paper mills will be able to replace worn equipment and install more efficient operating methods and systems.

Post-war conditions will require mill equipment of the highest efficiency, and Swenson engineers are prepared—with experience, engineering, and advanced design—to supply installations as outstandingly successful as those which have borne the Swenson name in the past.

SWENSON
SWENSON EVAPORATOR COMPANY
Division of Whiting Corporation
15653 Lathrop Avenue, Harvey, Ill.



STEAM STANDBYS
. . . NO AGE LIMIT

AMERICA'S urgent wartime call for more and more power has taken the "wraps" off reciprocating steam engines that haven't turned a wheel in years.

In keeping many of these old-timers on the job, Texaco is playing a vital part.

In engines old or new and whatever the steam temperature or pressure, *Texaco Steam Cylinder Oils* atomize completely, adhere to cylinder walls, separate rapidly from exhaust; assure quiet operation and low oil consumption.

A Texaco Lubrication Engineer is at your service to assist in selecting the most suitable oil for your service. They are available through more than 2300 Texaco distributing points in the 48 States. The Texas Company, 135 E. 42nd St., N. Y. 17, N. Y.

THEY PREFER TEXACO

★ *More buses, more bus lines and more bus-miles are lubricated with Texaco than with any other brand.*

★ *More stationary Diesel horsepower in the U. S. is lubricated with Texaco than with any other brand.*

★ *More Diesel horsepower on streamlined trains in the U. S. is lubricated with Texaco than with all other brands combined.*

★ *More locomotives and railroad cars in the U. S. are lubricated with Texaco than with any other brand.*

★ *More revenue airline miles in the U. S. are flown with Texaco than with any other brand.*

TEXACO

TEXACO Steam Cylinder Oils

FOR EVERY STEAM CONDITION

TUNE IN FRED ALLEN EVERY SUNDAY NIGHT — CBS ★ HELP WIN THE WAR BY RETURNING EMPTY DRUMS PROMPTLY

Ernie Pyle, *FAMED WAR CORRESPONDENT,* finds pure water vital to our fighting men

ERNIE PYLE, FAMED SCRIPPS-HOWARD WAR CORRESPONDENT

". . . you could almost say an army marches on its water," wrote Ernie Pyle in a recent dispatch from the Mediterranean front. "When a water point is found, the engineers wheel in their portable purifying unit. This consists of a motorized pump, and sand filter, chlorinating machine and a collapsible 3,000-gallon canvas tank. The chlorine we inject comes in powder form in 1 gallon cans—we usually use 1 part of chlorine to a million parts of water. The engineers of the 45th Division brought with them enough chlorine to last 6 months. In addition to chlorine, alum and soda ash are injected into the water."

THAT "chlorine in powder form" which Ernie Pyle speaks of is, of course, high test calcium hypochlorite, and, as likely as not, it's Mathieson HTH. That soda ash, too, is probably fused soda ash in tablet form made by Mathieson especially for use by our armed forces overseas.

Not as spectacular but just as important a war job is being done on the production front by other Mathieson Chemicals—caustic soda, soda ash, liquid chlorine, ammonia, sodium chlorite, sodium methylate, magnesium metal, liquid and solid carbon dioxide. These products are vital raw materials in nearly every phase of American war production, including ships, planes, tanks, guns, gasoline, clothing, food, medical supplies and many other materials which will go to make up final victory for the United Nations.

Mathieson CHEMICALS

ARMY NAVY

THE MATHIESON ALKALI WORKS (Inc.) 60 EAST 42nd STREET, NEW YORK, N. Y.

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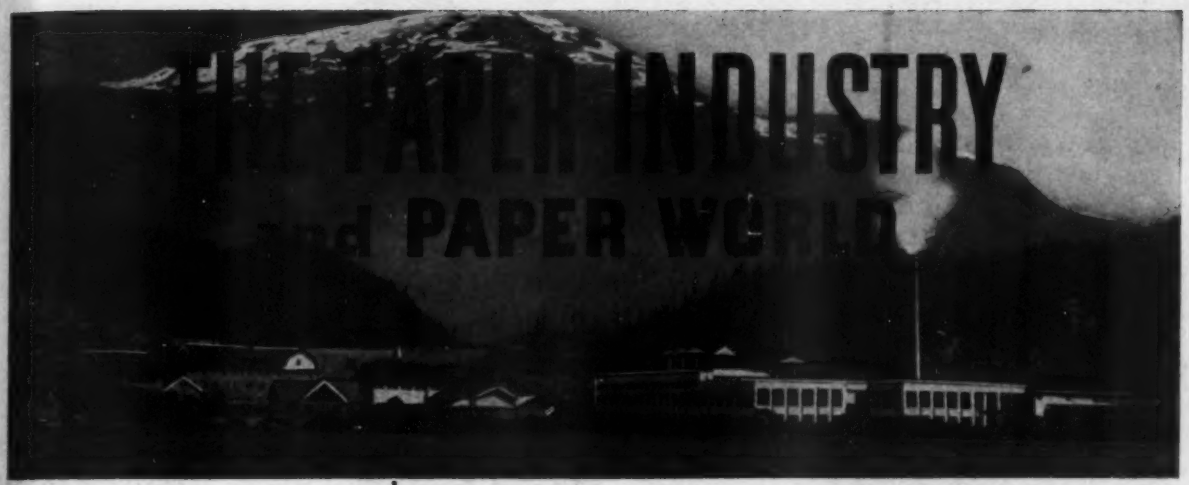
LIQUID CHLORINE . . . SODA ASH . . . CAUSTIC SODA . . . BICARBONATE OF SODA . . . BLEACHING POWDER . . . HTH PRODUCTS . . . AMMONIA, ANHYDROUS and AQUA . . . FUSED ALKALI PRODUCTS . . . SYNTHETIC SALT CAKE . . . DRY ICE . . . CARBONIC GAS . . . SODIUM CHLORITE PRODUCTS . . . SODIUM METHYLATE



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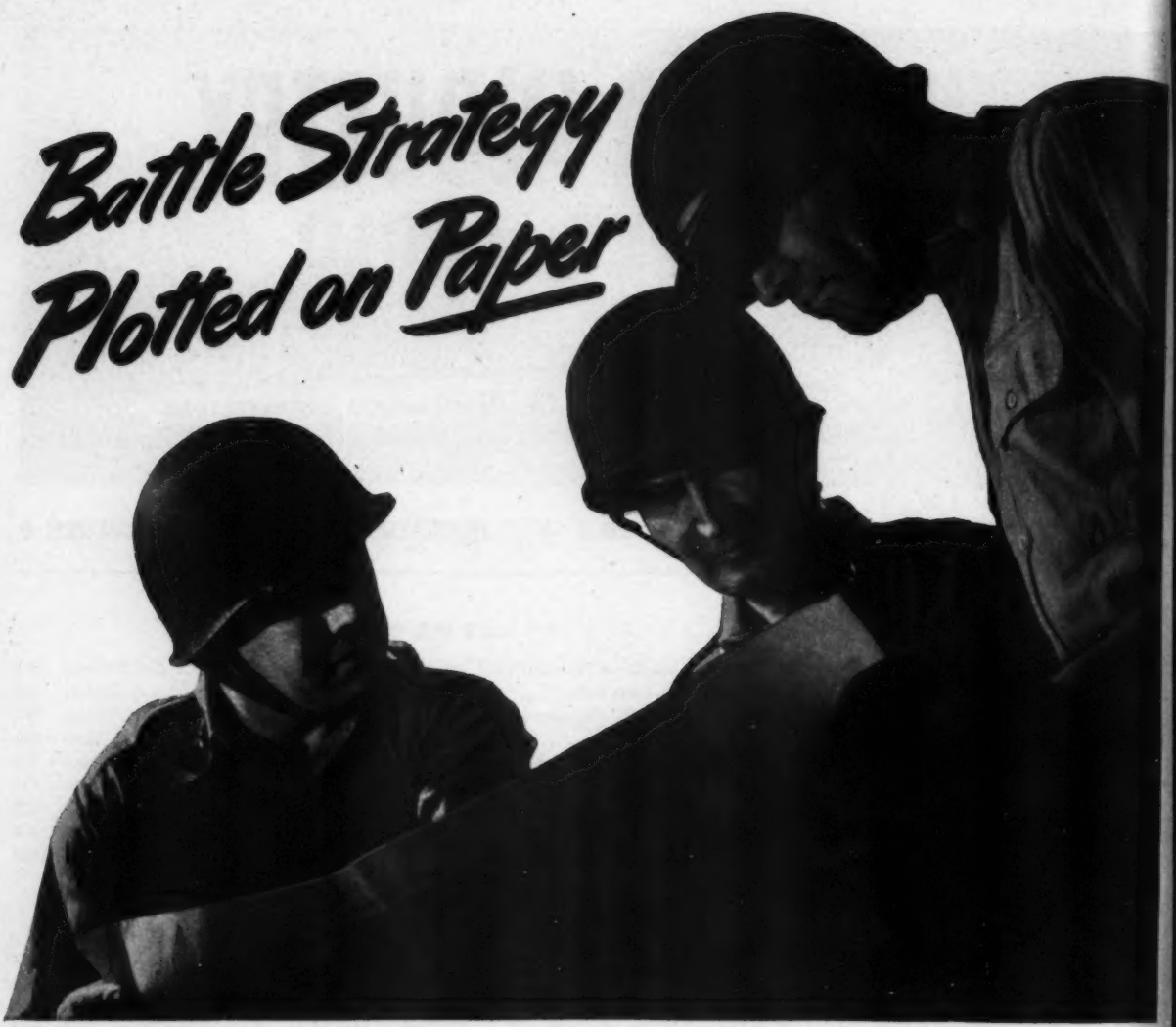


Every skirmish, every battle, every campaign—is plotted on maps before it is fought. From general headquarters, where global strategy is planned, to the outpost where a single fighting unit must clear a mountain pass or gain a bridgehead—maps guide the action of men and machines.

And maps mean *paper.* Mile on mile of paper specially designed for printing, for lithography, for photographic use, paper for quick, rapid sketches at the foremost front.

Maps may not require enormous tonnage, but no use of paper in all the war program is more vitally important. It's another case where nothing can take the place of paper—another way in which the essential paper industry is helping to win the victory.

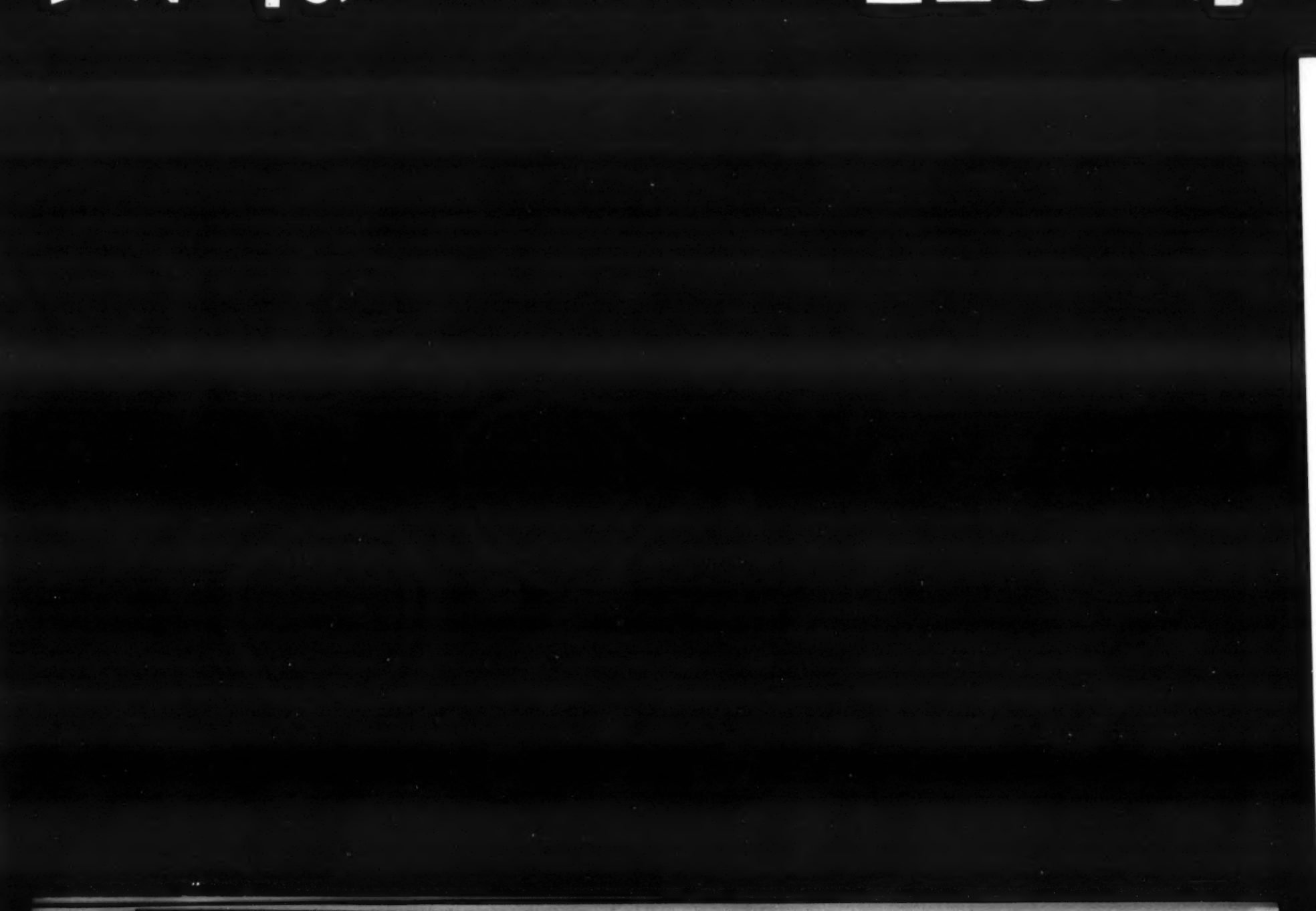
KENWOOD
WOOL PRODUCTS

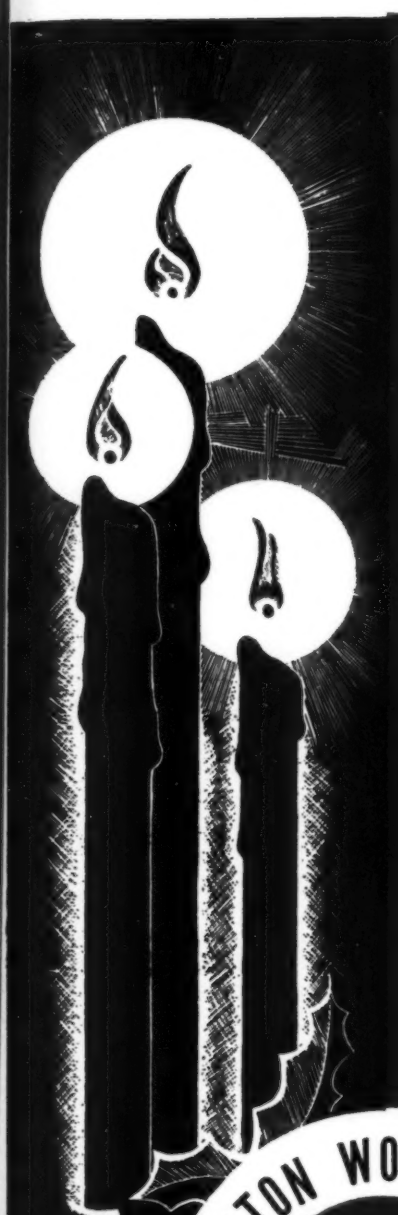
F. C. Huyck & Sons is proud to be serving an industry so essential to the war program. Our skill, our facilities and our 72 years of experience are always available in solving the special felt problems created by urgent wartime paper needs.

F. C. HUYCK & SONS

Kenwood Mills

Albany New York





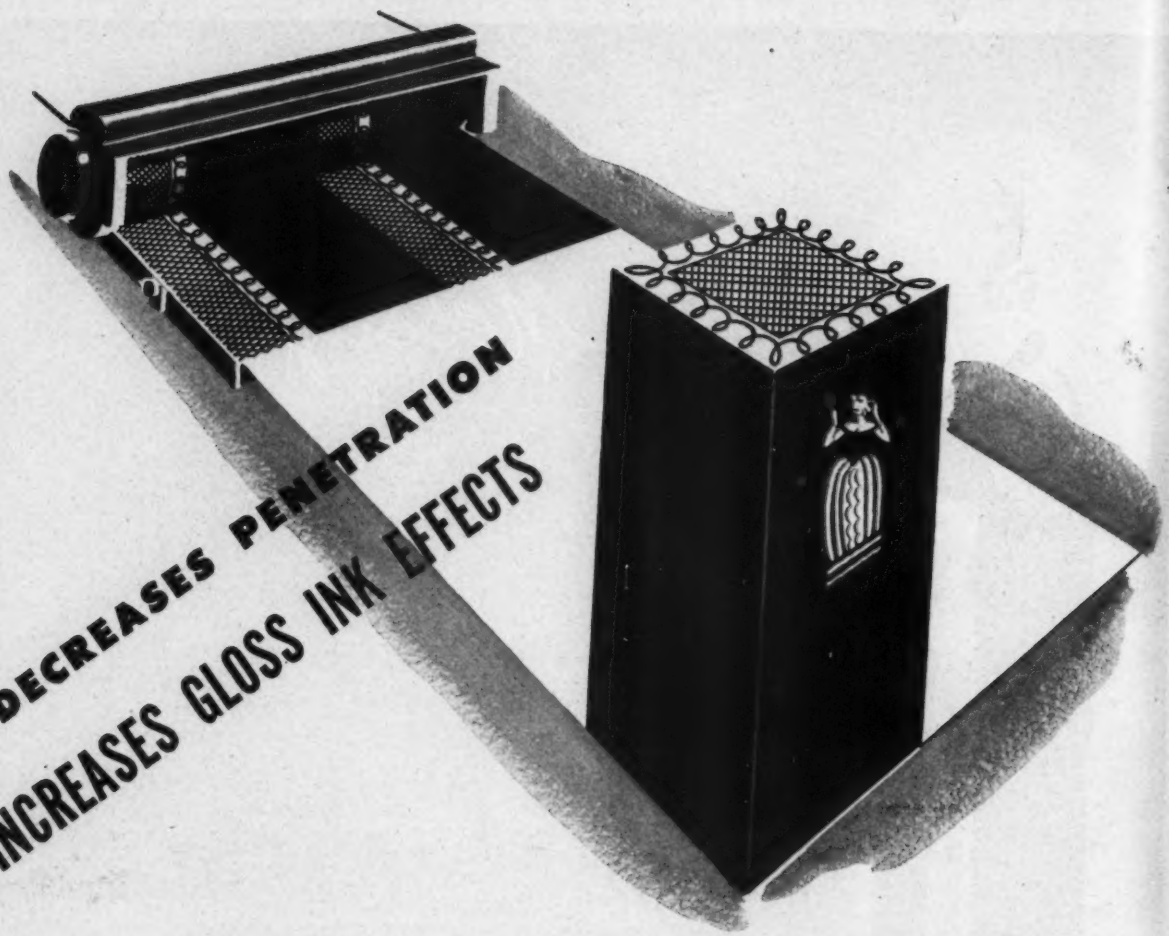
A Christmas Message

At this season of the year we like to step aside from commercial interests and wish all our good friends a Merry Christmas and a Happy New Year.

BOSTON WOVEN HOSE AND RUBBER COMPANY

BWH

WORKS:
CAMBRIDGE, MASS., U.S.A.
P.O. BOX 1071,
BOSTON, MASS., U.S.A.



METHOCEL
- Promotes Uniform Ink Receptivity
- Extends Ink Supplies
- Provides Grease Proofing for Paper

METHOCEL, the economical sizing material, permits outstanding gloss ink effects with regard to brightness and gloss of printing. It also aids in achieving an unusual degree of uniformity of ink receptivity—thus extending ink supplies through decreased penetration into the stock.

METHOCEL also effects valuable conservation of materials used in other paper and packaging operations. It reduces paraffin requirements and, being completely impervious to greases, fats, waxes and oils, does the work that often requires the use of one or more additional materials. These unusual qualities, plus exceptional film-forming properties, make METHOCEL a valuable and important "tool" to the paper industry.

THE DOW CHEMICAL COMPANY
MIDLAND, MICHIGAN

New York • St. Louis • Chicago • Houston
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METHOCEL

THE UNIFORM SIZING MATERIAL

DOW
CHEMICALS INDISPENSABLE
TO INDUSTRY AND VICTORY

Ask POWELL for the Answer to all your VALVE requirements

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THE WM. POWELL CO.
Dependable Valves Since 1846
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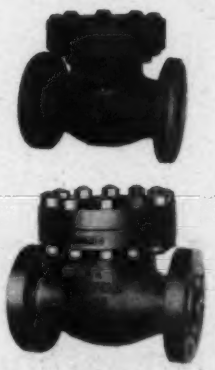

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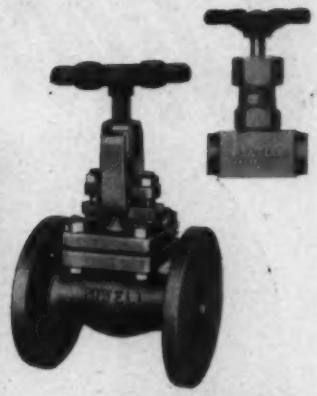

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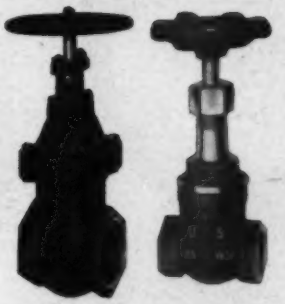

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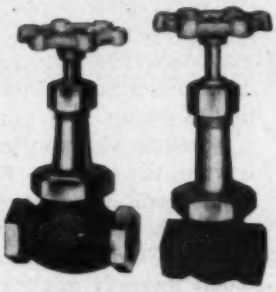

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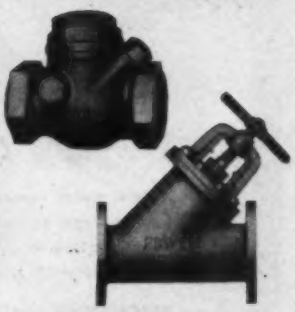

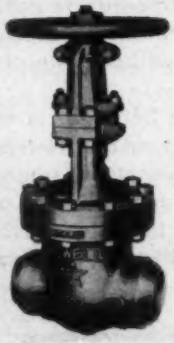

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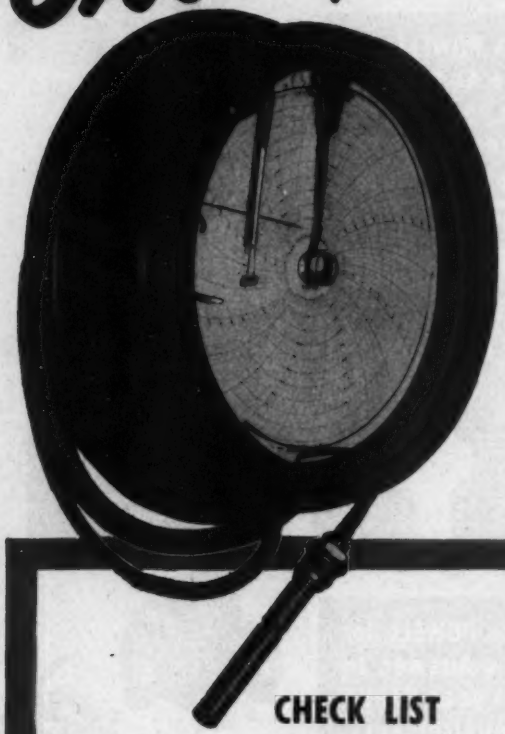
A Gold Star, to be added to our Maritime "M" Pennant, has just been awarded us for continued meritorious production performance during the last six months.

POWELL VALVES

Check These Chances



to improve your production through temperature records!

CHECK LIST

A few major temperature points where records from Foxboro Temperature Recorders often reveal opportunities for important production improvements:

PAPER STOCK LINES	BEATERS
DRYERS AND OVENS	GRINDERS
CHLORINE LINES	DIGESTERS
ACCUMULATORS	BLEACHERS
CONDENSERS	SIZE TANKS

A STAR IS ADDED . .

For continued outstanding production, The Foxboro Company has won renewal of the Army-Navy "E" Award.

Is it worth a few minutes of your time to stop important losses in your output, wastes of fuel, or spoilage of materials? All you need to do is review the critical temperature points in your equipment, and make sure you're getting daily records that "show up" such production losses!

No matter what step in your operation demands uniform temperature, Foxboro Temperature Recorders will automatically give you exact information to save quality-variations, spoilage and re-runs. Their ultra-sensitive thermal system reacts instantly to slightest temperature deviations. Their light, strong mechanism "writes it down" *accurately* for years, without attention except routine chart changes.

The Foxboro Temperature Recorder is one instrument you can always depend on. Precision-engineered for accuracy, endurance and trouble-freedom, it gives the facts at minimum cost per year! Write for full details in Bulletin 198-2. **The Foxboro Company, 158 Neponset Avenue, Foxboro, Massachusetts, U. S. A.**

FOXBORO

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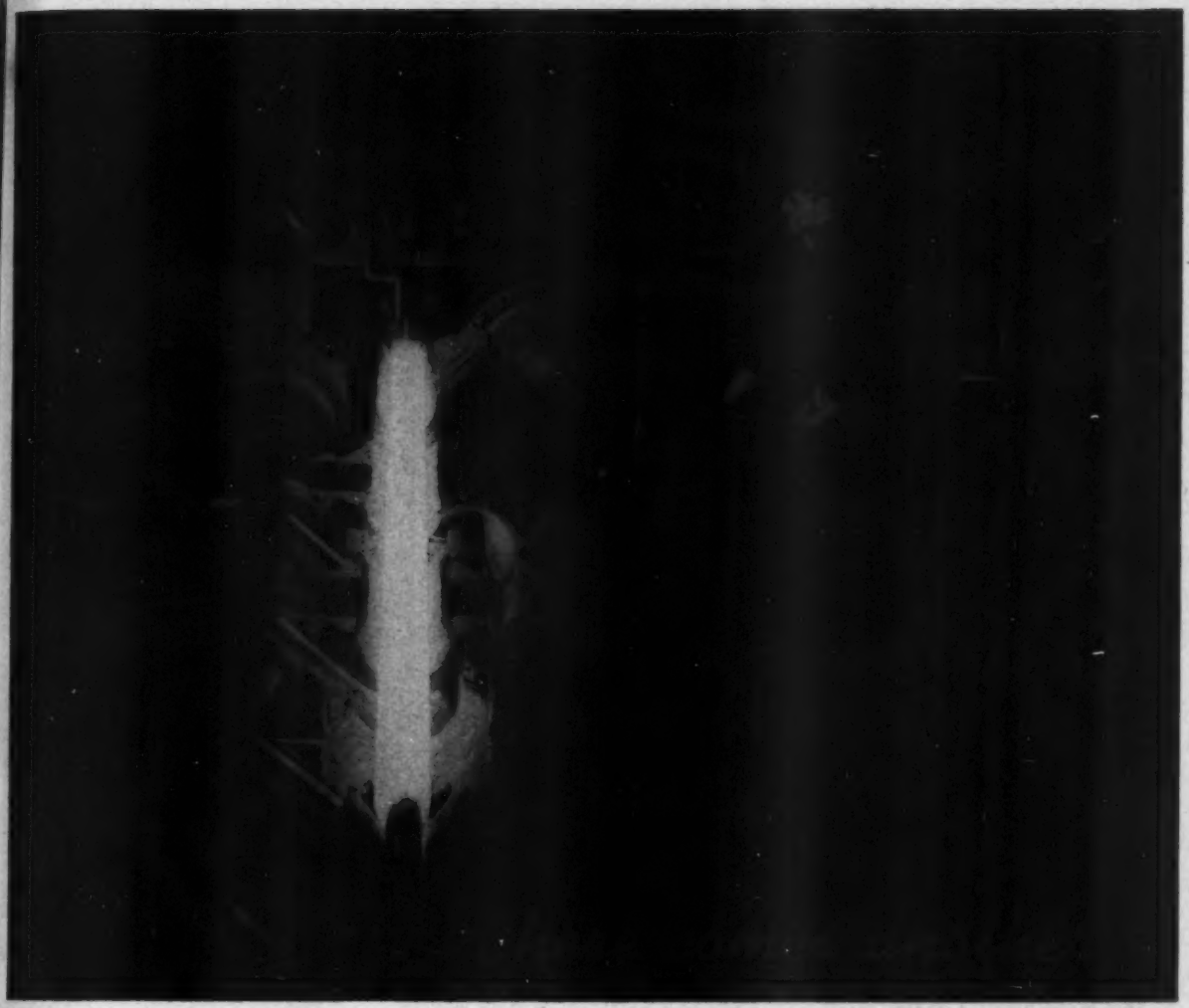
TEMPERATURE RECORDERS



TIMKEN SEAMLESS NICKEL STEEL TUBE

to give greater corrosion resistance where needed

FOR economical corrosion-control nothing can equal Timken Nickel Steels. Extensive and exhaustive tests, conducted over a period of years, show that steel tubes made of Timken Nickel Steels give constantly *better* results in black liquor evaporators.

That's why so many leading mill operators who want to forestall "black liquor" and other lags in vital war production are turning to Timken Nickel Seamless Steel Tubing.

No matter how exacting your own requirements may be, there is sure to be a special analysis Timken Steel Tube ready to meet them.

A Timken metallurgical specialist will be glad to help you choose the best tubing for your mill. Write: Steel and Tube Division, The Timken Roller Bearing Company, Canton 6, Ohio.

VICTORY IS IN SIGHT—IF WE KEEP OUR EYES OPEN

TIMKEN

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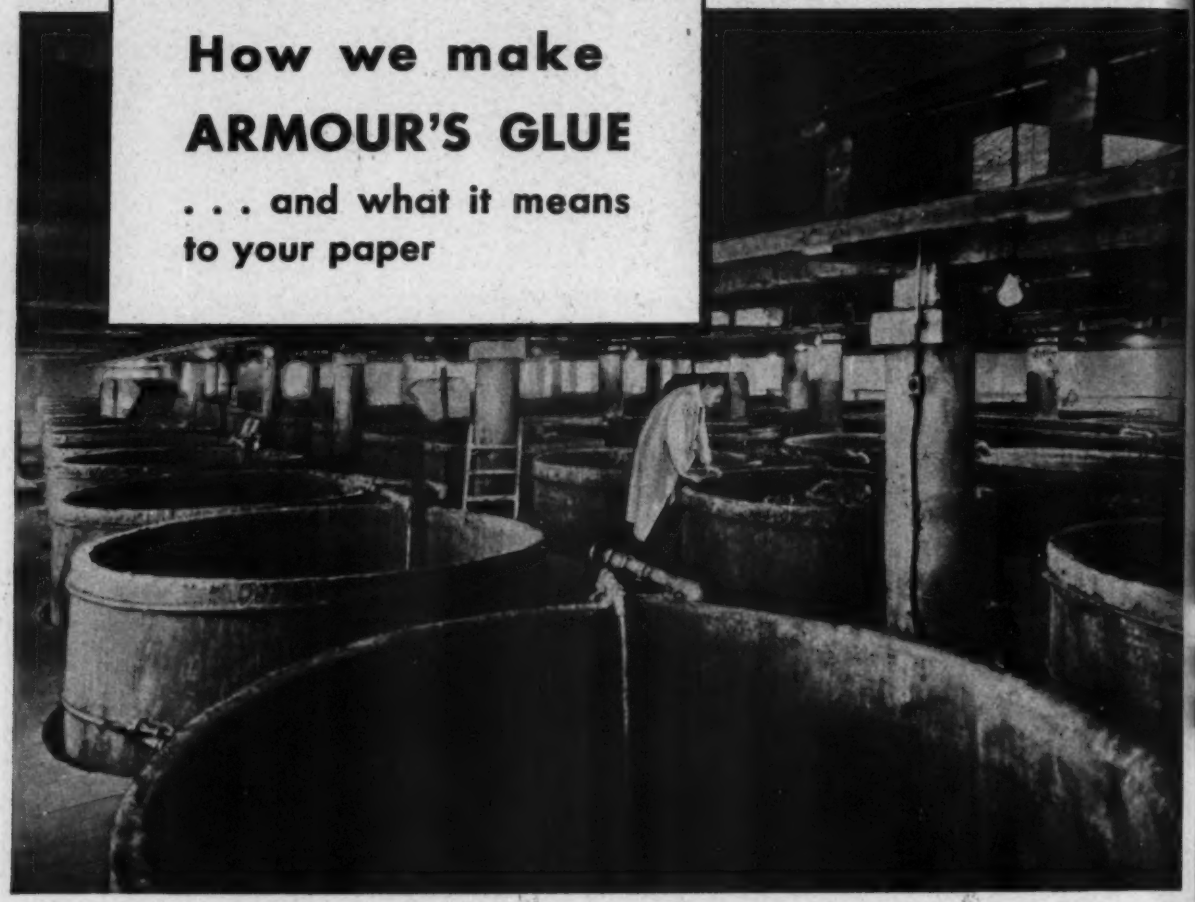
SEAMLESS STEEL TUBES

How we make ARMOUR'S GLUE

. . . and what it means to your paper



This is the Steam Cooking Floor

Here the glue liquors are cooked out of the raw materials in rows of large vats heated with live steam.

This may look like a simple mass production process. It isn't. The materials in each of these vats differ, physically and chemically, from the materials in the next vat. Each must be handled as an individual problem in glue making. Painstaking control must be observed.

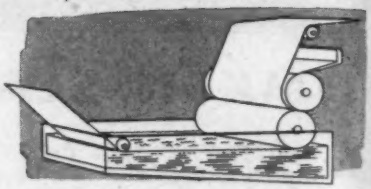
So, to cook each batch to just the right degree, and for just the right time, our glue technicians keep an exact record of the progress of the materials in every vat. And they back that up with laboratory checks.

This process, like every other step in the manufacture of Armour Glues, is scientifically controlled, specifically planned to turn out reliable, strong, easy-working glues for you.

This is Where Controlled Steam Cooking Pays Off

Right in your own product . . . right in your sizing vats... the controlled steam cooking of Armour's Glue means greater efficiency for you.

You see, that high jelly strength, viscosity and tensile strength you find in Armour's Glue is something you can count on . . . something that means efficient, uninterrupted production in your mill.



Those qualities come from the controls we apply to all our processes. They're the reasons why we have faith in our product's worth to you.

As you know, we can't make enough of certain grades of Armour's Glue to keep up with the demand. But despite that temporary condition, we'd like to talk to you now about future uses for Armour's Glue. May we have an appointment?

Glue it for good with Armour's

ARMOUR *Glue* DIVISION

Manufacturers of Hide Glue, Bone Glue, Flexible Glues, Soluble Dried Blood, Blood Albumin

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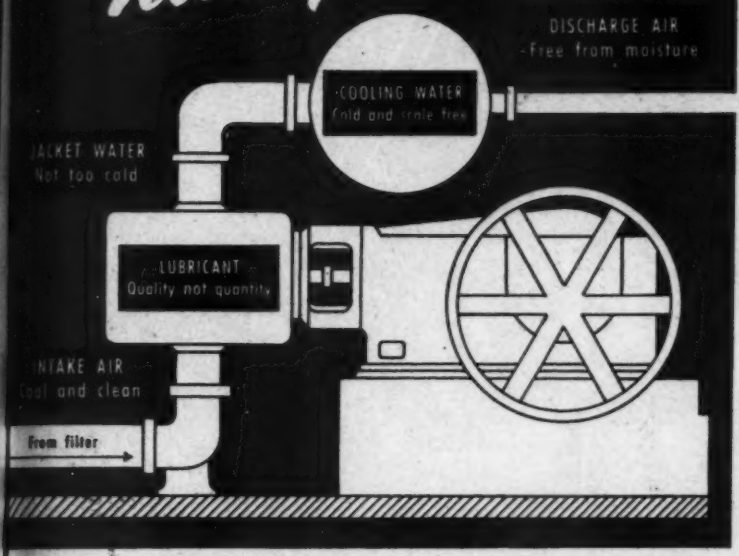
Air compressors hard pressed?



Here are some suggestions to help keep them out of trouble

CONDITIONS under which compressors operate, particularly under today's heavy loads, tend to cause excessive deposits. Improper lubrication is not always responsible for these deposits, but a compressor lubricant with the right qualities can reduce or eliminate many of them. The causes of some of the more common compressor operating problems and suggested cures are listed here:

Unstable Oils. Oxygen in the air and heat generated by compression tend to oxidize conventional oils, causing the formation of carbon and asphaltic substances which deposit on valves.

Keep intake air temperatures as low as possible. Be sure inter-coolers and after-coolers are supplied with an ample flow of cold water to keep air temperatures as low as possible. Keep this equipment clean and free from scale and rust. Use Stanoil from which the unstable hydrocarbons—those affected by heat and oxygen—have been removed, eliminating many troublesome deposits at the source.

Dirty Intake Air. The enormous volume of air required by compressors, particularly under heavy load, may introduce a large quantity of dirt and dust.

Be sure conditions have not changed which might increase such contaminants in the intake air in your compressors. Use efficient air screens and keep them clean. Use Stanoil which resists the formation of gummy deposits that might collect dirt and dust from the air and add to deposits on valves.

Condensation in Cylinder. Cooling water temperatures are extremely important. If water supplied to the cooling jacket is excessively cold, it will cause moisture in the compressed air to condense. This will wash off the lubricant film and cause excessive cylinder wear.

Preheat jacket cooling water by running it through the inter-cooler, or reduce the flow so that the temperature of the water when it leaves the water jacket is not below 100° F.

Condensation in Inter-coolers. Water in the inter-cooler should be cold enough to condense the oil and moisture in the compressed air, so that they can be removed before they enter the high pressure cylinder and cause excessive deposits.

Be sure an ample flow of cold water is supplied to the inter-cooler. Drain condensed oil and moisture from inter-coolers and after-coolers frequently if they are not provided with automatic outlets.

Over-Lubrication. Over-lubrication is the cause of much compressor trouble. In compressor operation, oil is not burned up as it is in internal combustion engines, nor is it washed away as it is in steam engines. Oil remains in the compressor cylinder a long time, and if it is of the right quality, very little is needed. An excessive amount of oil increases the possibility of deposits in valves, inter-coolers, and air lines.

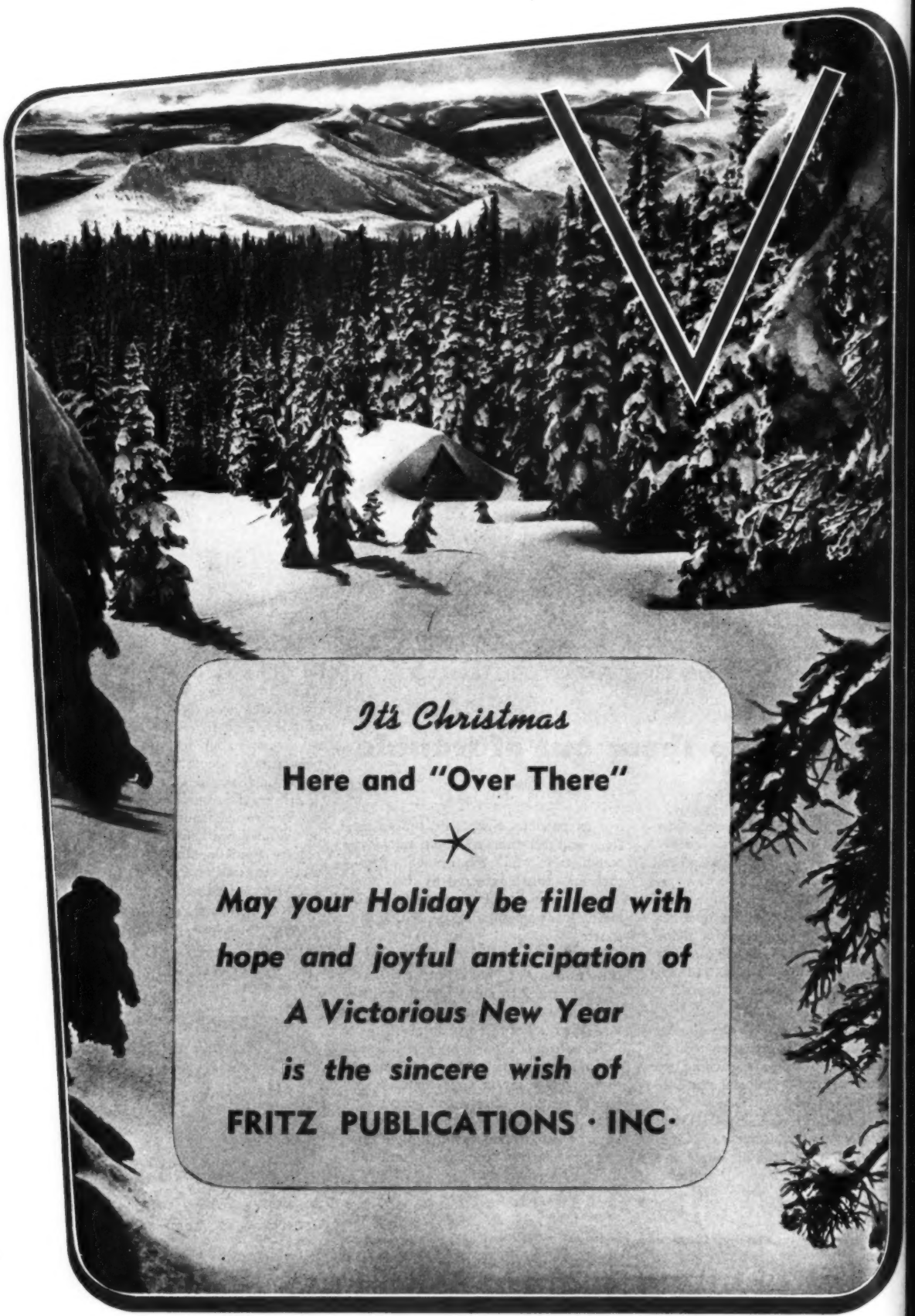
Adjust oil feed to the minimum necessary to give an adequate film of lubricant on cylinder walls. Compressors usually require from one-fifth to one-tenth as much oil as steam cylinders of similar size. Because of the high lubricating quality of Stanoil, only a very small amount is needed to secure adequate lubrication.

Oil is Ammunition... Use it Wisely

STANOIL

STANDARD OIL COMPANY (INDIANA) STANDARD SERVICE

LUBRICATION ENGINEERING • • LUBRICATION ENGINEERING • • LUBRICATION ENGINEERING • • LUBRICATI


It's Christmas
Here and "Over There"
May your Holiday be filled with
hope and joyful anticipation of
A Victorious New Year
is the sincere wish of
FRITZ PUBLICATIONS · INC·

New Pulp Distribution Plan

▸▸▸ On Thursday, November 11, 1943, David Graham and L. K. Larson of the Office of Pulp Allocation of the War Production Board met in an all-day session with twenty-six representatives of the American Paper and Pulp Association and the Divisional Associations to discuss the operation of the new pulp allocation plan. This report, based on the results of this conference, has been reviewed by Mr. Graham and Mr. Larson.

Effective January 1, 1944, allocations of wood pulp will be on a quarterly rather than a monthly basis.

On the same date the new pulp distribution plan, similar in some respects to the Controlled Materials Plan which governs the distribution of critical metals, will become operative. While complete details of the plan have not yet been officially announced, the general principals govering the operation of the plan have been publicly discussed. New pulp application forms have been issued this week.

In operation the proposed plan will have two objectives:

1) The balancing of pulp supply and demand.

2) The control of paper and paperboard production through pulp allocation, coupled with the issuance of limitation orders controlling use and conversion of paper and paperboard.

How Supply and Demand Will Be Balanced

The balancing of supply and demand will be a function of a Requirements Committee composed of representatives of some eighteen Claimant Agencies, including the Army, Maritime Commission, Office of Civilian Requirements, etc.

The Office of Pulp Allocation of the War Production Board will report to the Requirements Committee its estimates of pulp production by grades for an ensuing quarter. These estimates will be based on production reports submitted by all pulp producers on Form WPB 699. In total, these estimates, in combination with estimates of pulp imports, will indicate to the Requirements Committee the total pulp supply available for distribution in the succeeding quarter.

Paper producers will concurrently file with the War Production Board a revised pulp application form designated "WPB 2973". On this form the paper producer will be asked to project for the ensuing quarter (1) his proposed paper and paperboard production by grades and, (2) his requirements of pulp by grades to fulfill this production schedule; in addition, Form WPB 2973 will require information relative to the estimated distribution of his proposed production of each grade of paper and paperboard among various groups of users —there will be listed for this purpose not more than eleven groups of users for each segment of the industry. The flow of the industry's products to these groups of users will, therefore, be measured, tabulated, and reported to the War Production Board on the approved forms. By totalling these claims upon the pulp supply, a classified schedule of estimated overall pulp demand for an ensuing quarter can be prepared.

Once these estimates have been received from the industry, and the results tabulated, the Forest Products Bureau will submit to the Requirements Committee, together with this information, its own recommendations in terms of specific tonnages of pulp to be allocated for use in the manufacture of specific tonnages of the various classes of paper and paperboard, based on its best estimates of the quantities of the various classes of paper and paperboard which, considering the available raw materials, should be produced to best meet essential war and civilian needs. In conjunction with these estimates, the Requirements Committee will consider the recommendations of other interested Government Agencies together with estimates of special requirements as presented by Claimant Agencies of the Federal Government. The final responsibility for the weighing and balancing of these basic data on pulp supply and pulp demand lies with the Requirements Committee.

EDITOR'S NOTE: The new Pulp Distribution Plan is covered in the accompanying release sent to pulp and paper mill members on November 12 by E. W. Tinker, executive secretary of the American Paper and Pulp Association.

How Paper Production Will Be Controlled

The Requirements Committee, after it has completed its studies of supply and demand estimates, will determine the minimum quantity of each class of paper that shall be produced overall. To the extent that a pulp deficit appears imminent, the deficit will be met by a directive instructing the Pulp Allocation Office to restrict the consumption of pulp for the production of specified classe of paper and paper board.

How Pulp Will Be Distributed

These basic determinations will be delivered by the Requirements Committee to the Forest Products Bureau. The Pulp Allocation Committee will recommend the distribution of pulp in a manner that will conform with the production directives of the Requirements Committee.

"The War Production Board feels that adherence to the following policies in the allocation of wood pulp will provide the proper incentive for maximum pulp production and at the same time insure the production of the required amounts of the types of paper and paperboard needed to meet war and essential civilian needs.

"(1) Each wholly integrated mill and each partially integrated mill is permitted to consume in its own paper mill all of its own pulp production except that:

(a) Wood pulp may be diverted (from wholly and partially integrated mills) where it is necessary to do so to insure as between non-integrated paper mills and integrated paper mills an equitable distribution of the burden or benefit resulting from the fulfillment of Ordnance requirements and Export requirements of

Lend-Lease and the Office of Economic Warfare, but in such cases diversions are made only to the extent that it will not interfere with the war effort or essential civilian supply or where diversion is necessary to increase the production of essential papers.

(b) Wood pulp may be diverted from wholly and partially integrated mills if such mills have made a practice of making and selling wood pulp but such diversions are only made to mills requiring such wood pulp to produce products for war and essential civilian needs. In such cases diversions of wood pulp are made equitably to the extent that equitable diversion does not interfere with war and essential civilian needs.

"(2) Partially self-contained mills are allocated sufficient market wood pulp to enable such mills to utilize all the pulp they can produce.

"(3) Paper mills with waste paper or rag conversion plants are allocated sufficient market wood pulp to enable them to utilize the maximum capacity of their plants for fibre supplementary to wood pulp.

"(4) Paper mills producing no wood pulp or utilizing no waste paper or other supplementary fibrous material are allocated sufficient market wood pulp for the production of essential papers which cannot be produced in wholly or partially integrated mills or in mills with waste paper or rag conversion plants.

"(5) The remaining market wood pulp is allocated to all mills other than wholly self-contained mills to achieve, in so far as possible, equitable rates of operation in such mills.

"Where a company owns a pulp mill physically separated from that company's paper mill, the output of the pulp mill is allocated to the paper mill, unless in the opinion of the War Production Board, the pulp is required for the manufacture of more essential paper or paperboard elsewhere. However, if the paper mill is equipped and qualified, in the opinion of the War Production Board, and consents to manufacture the more essential papers and paperboard required, the paper mill has the right to the allocation of the pulp from its own pulp mill for that use.

"However, in no event will the combined ownership of pulp mills and paper mills serve to lessen the responsibility of the paper mill to utilize the greatest possible quantity of fibers supplementary to wood pulp."

Limitation Orders

This change in pulp allocation policy and method is to be supplemented by the issuance or revision of appropriate limitation orders which after program determination will be designed to bring about a balance between supply and demand to avoid the necessity for the allocation of paper or paperboard except where specially acute shortage may arise as for example in the supply of container board for V boxes, etc. These "L" orders will either place restrictions on the manufacture of certain classes of paper and paperboard or establish quotas on the various end products into which they may be converted. These orders will be issued by the appropriate Industry Division in accordance with the directives of the Director of the Forest Products Bureau.

The procurement of the end-use data requested on the official forms will undoubtedly present difficulties in the case of certain grades. Most companies, however, have had a measure of experience with problems of this type. It would appear that these assembled end-use data will not only serve as a guide in the determination of paper and paperboard requirements but that they may also uncover hitherto unavailable data that will tend to further the establishment of the essentiality of paper and paperboard production.

A chart of the Pulp Allocation Procedure is available.

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PERSONNEL CHANGES IN FOREST PRODUCTS BUR.

▶▶▶ ON NOVEMBER 11, Harold Boeschenstein, director of the Forest Products Bureau of the WPB, made the following announcement of personnel changes in the pulp and paper divisions of the Bureau:

Agner D. Hansen of Green Bay, Wisconsin, chief of the WPB Pulp Production office, has resigned. Mr. Hansen organized the Pulp Production office and established regional pulpwood representatives in the several regional offices of the WPB, in an effort to co-ordinate federal and industry activities in increasing the cut of pulpwood, Mr. Boeschenstein stated.

After four months' service, Mr. Hansen has resigned to return to his own company, the Northern Paper Mills, of Green Bay, Wisconsin, of which he is president and general manager.

At the same time, Mr. Boeschenstein announced the appointment of James L. Madden, vice president of Hollingsworth and Whitney Company, Boston, Massachusetts, as deputy director of the WPB Paper Division. As such, Mr. Madden will take over the direction of the pulpwood production program formerly handled by Mr. Hansen through the pulp production office. Mr. Madden has been active in the paper industry since 1934 when he joined the staff of the Hollingsworth & Whitney Company. For over a year he has been serving as a member of the WPB Wood Pulp Allocation Committee which meets frequently in Washington in connection with the allocation of pulp to papermaking mills throughout the United States. His position as Deputy Director of the Paper Division will be co-ordinated with those of Henry G. Boon in the Fine Paper Branch and Harold C. Nichols, of the Coarse Paper Branch of the Paper Division, as well as with the Paperboard Division and the Lumber Division.

H. H. Collett will be assistant to Mr. Madden directing pulpwood production. Mr. Collett, who has been handling pulpwood problems for the WPB for over a year is a graduate forester with experience both in private industry and with the U. S. Forest Service.

Three other recent appointments in the Fine Paper Branch of the Paper Division, announced by Rex W. Hovey, director of the Division, today were:

William J. Ward, executive vice president of the Watab Paper Company, Sartell, Minn., and a resident of Evanston, Ill., has been designated as chief of the Groundwood Paper Section.

Harrison Baldwin, vice president in charge of sales of the Hammermill Paper Company, Erie, Pa., has been appointed as chief of the Writing Paper Section. Has been engaged in the paper business for 29 years, and prior to that was a newspaper man.

Richard Wortham, of Scarsdale, New York, general sales manager of the Perkins-Goodwin Company and a director of the Southland Paper Mills, Lufkin, Texas, as chief of the Newsprint Paper Section.

These men have been granted leave of absence from their respective companies to accept positions in the WPB, it was announced today by Mr. Hovey, who added that several more appointments would be made in the near future by way of completing the organization of the Paper Division.

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▶▶▶ A FIRE OF UNDETERMINED ORIGIN on November 13 at the Chesapeake Corporation, West Point, Virginia, resulted in damage to the paper machine estimated by officials of the company at several thousand dollars. The machine is located in the new portion of the plant. Flames destroyed the felt around the machine, wiring and bearings.

PAPER · · · America's 6th Industry

WASTE PAPER FOR VICTORY

(NEWS ITEM: *Our newest drive to collect waste paper and paperboard is one of the projects of the Boy Scouts of America.*)

Hundreds of service organizations have offered their help in our new drive to collect waste paper and paperboard.

Waste paper and pulpwood are the chief raw materials from which containers are made. Millions of these containers are being sent overseas every week to supply our fighting forces and Allies with food, medical supplies, clothing, and many weapons of war.

A serious factor in the waste paper shortage has been that these containers being sent overseas cannot be returned for re-use.

The cooperation of Puseyjones engineers is offered to every mill seeking to step up production and improve the quality of paper products needed in the Victory Program.

The newly improved Puseyjones Simplex Press Arrangement was developed in the interest of reducing paper breaks, making felt changes easier and quicker, and saving in floor space.

The Puseyjones Simplex Press Arrangement meets the urgent need for increased tonnage with existing machines.

The many practical and technical advancements we are learning while serving the war effort will result in greater improvements and more efficient equipment in our Post-War Paper Making Machinery. In the meantime—until the Victory is won—Puseyjones men and production facilities are still on war work.

PLANNING AHEAD? For paper and pulp mill executives looking forward to the solution of post war production problems, we will gladly furnish reprints of three informative articles prepared by Puseyjones engineers—"The Post-War Fourdrinier Machine," "Development of Stream-Flow Vat System," "The Flow Spreader." Ask for reprints by name.

THE PUSEY AND JONES CORPORATION

Established 1848. Builders of Paper-Making Machinery

Wilmington, Delaware, U. S. A.

THE SIGN OF TRADE MARK SUPERIOR QUALITY

Printed on paper containing 10% ink-baled old newspapers
2¢ DAILY NEWS
Printed on paper containing 10% ink-baled old newspapers
2¢ DAILY NEWS
Printed on paper containing 45% de-inked old newspapers
2¢ DAILY NEWS
Printed on paper containing 23% de-inked old newspapers
2¢ DAILY NEWS
Printed on laboratory reference roll—all new pulp
2¢ DAILY NEWS

DEINKED AND NONDEINKED NEWSPRINT TEST RUNS

Both in New York City and Chicago, sample press runs of newspapers have been made using newsprint made of (a) all new pulp; (b) 23 per cent and (c) 45 per cent deinked newspapers; (d) 10 per cent and (e) 20 per cent undeinked newspapers.

Sample runs of the *New York Daily News* were made November 10, and similar copies of *The Chicago Tribune* were run off the press in Chicago November 29. At each demonstration, a delegation of publishers, newspaper editors, paper men, and WPB officials watched the experiment.

The consensus opinion of those present at these experimental runs was that there seemed but a slight difference in texture, general appearance, and printing clarity of the various samples. The newsprint containing 45 per cent deinked wastepaper provided clear, readable pages.

Commenting on the demonstration, P. M. Loddengaard, of the Bulkley, Dunton Pulp Company, expressed the view that the demonstration has proved beyond any doubt the practicability of using deinked papers in the manufacture of newsprint. He added, however, that for the immediate future, mills will most likely use undeinked papers because their use requires no deinking equipment.

Deinking experiment work has been carried on at the laboratory of the New York State College of Forestry in co-operation with the two newspapers mentioned above.

Newspaper and paper trade executives and WPB officials examine results of press runs on deinked paper stock run off on "Chicago Tribune" presses. 1—J. G. Sheldon, exec. sec'y Chicago Metropolitan area of the WPB; 2—Russell B. Mill, "Pantagraph", Bloomington, Ill.; 3—Gregory Lutz, Hammond (Ind.) "Times"; 4—Robert E. Shaw, Dixon (Ill.) "Telegraph"; 5—C. D. Adkins, Morrill Ink Co.; 6—Geo. R. Bolton, Joliet (Ill.) "Herald-News"; 7—John W. Park, promotion manager, "Chicago Tribune"; 8—Wark Mayborn, Chicago "Sun"; 9—Donald J. Beaton, "Fibre Containers"; 10—Frank H. Just, Waukegan (Ill.) "News-Sun"; 11—Harry J. Bettendorf, "Fibre Containers"; 12—Wm. J. Just, Waukegan (Ill.) "News-Sun"; 13—Harry E. Weston, "The Paper Industry and Paper World"; 14—C. E. Head, Kenosha (Wis.) "News"; 15—(Unidentified); 16—R. S. Kingsley, Kenosha (Wis.) "News."

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FINANCIAL

▶▶▶ Reports of an early peace served to depress the value of all securities on the various markets and paper mill stocks suffered along with other industrials.

Certain-teed Products Corporation—Net profit for nine months ending September 30, 1943, was $471,418, as compared with $800,797 for the same period in 1942.

Container Corporation—Net profit for the September quarter was $530,364, as against $455,860 for the same quarter in 1942.

Continental Diamond Fibre Company—Net profit for nine months ending September 30, 1943, was $329,007, as compared with $361,153 the previous year.

Eastern Manufacturing Company—Net profit for nine months ending September 30, 1943, was $274,287, as against $328,461 in the comparable period of 1942.

Robert Gair Company—Net profit for nine months ending September 30, 1943, was $652,353, as against $621,224 for the same period in 1942.

Great Northern Paper Company—Net profit for nine months ending September 30, 1943, was $1,200,585, as against $1,359,343 for the previous year's comparable period.

Hinde & Dauche Paper Company—Net profit for nine months ending September 30, 1943, was $784,208, as compared with $994,319 for the same period in 1942.

Hummel-Ross Fibre Corporation—Net profit for thirty-six weeks ending September 30, 1943, was $224,449, as against $312,772 a year ago.

International Paper Company—Net profit for nine months ending September 30, 1943, was $6,622,474, as compared with $7,244,070 for the same period in 1942.

Kimberly-Clark Corporation—Net profit for twelve weeks ending September 30, 1943, was $1,168,985.

Mead Corporation—Net profit for sixteen weeks ending October 2, 1943, was $288,642, as against $245,074 for the comparable period in 1942.

Oxford Paper Company—Net earnings for the nine months ending Sep-

TANDEM!

Wherever possibilities exist for arranging machines to operate in tandem, or series, so as to keep material moving and cut out stopping places, Reliance engineers can offer constructive help.

Pioneering work done by Reliance in adapting motor-drives to the continuous processing of materials in coil form has done much to reduce costs and improve quality and uniformity.

If you would like to talk over the applications and requirements of tandem operation and ways in which motors can be teamed up to produce most satisfactory results, send for a Reliance man.

With the aid of Tandem (or Range) Drive, material is processed faster and with less handling, power and maintenance expense are lowered and space is saved

RELIANCE A-C D-C MOTORS

RELIANCE ELECTRIC & ENGINEERING CO.

1088 Ivanhoe Road • Cleveland, Ohio

Birmingham • Boston • Buffalo • Chicago • Cincinnati • Detroit • Greenville (S. C.) • Houston • Los Angeles • Minneapolis • New York • Philadelphia • Pittsburgh • Portland (Ore.) • St. Louis • San Francisco (Calif.) • Syracuse (N. Y.) and other principal cities.

tember 30, 1943, were $704,530, as compared with $376,372 for the same period in 1942.

Paraffine Companies—Net profit for the September quarter was $425,602, as against $411,268 for the same quarter in 1942.

Parker-Young Company—Net profit for the fiscal year ending August 31, 1943, was $30,350, as compared with $257,769 for the previous year.

Puget Sound Pulp & Timber Company—Net profit for nine months ending September 30, 1943, was $354,250, as compared with $625,041 for corresponding period of 1942.

Scott Paper Company—Net profit for nine months ending September 30, 1943, was $998,619, as against $1,049,738 for the comparable period in 1942.

Soundview Pulp Company—Net profit for nine months ending September 30, 1942, was $644,403 as against $825,142 for the previous year.

New York Stock Exchange—Stocks

	Closing Prices Oct. 25, 1943	Nov. 27, 1943
A. P. W. Paper Co...	2½	2½
Celotex	10⅜	12¼
Same Preferred.....	16½	*18¼-18½
Certain-teed	5	*5¾-6
Same Preferred.....	58½	67
Champion P. & F. Co.	18¾	*20-20¼
Same Preferred.....	107½	107¼
Container Corp.	19½	21½
Continental Diamond	10½	*12-12⅝
Crown Zellerbach	15½	16½
Same Preferred.....	95⅛	*98-98¼
Dixie Vortex	14½	*13¾-14¼
Same "A"	43¾	44¼
Robert Gair	2¾	*2⅞-3
Same Preferred.....	13	*13⅛-14
Gaylord Container	13	12¾
Same Preferred.....	51½	51⅜
International Paper....	12½	13⅛
Same Preferred.....	64½	66⅜
Kimberly-Clark	29¾	*30⅛-32
MacAndrews & Forbes	25⅛	25¼
Masonite	36½	38
Mead Corp.	7¼	8
Same Preferred.....	83	*83-85
Paraffine Cos.	42	43¼-44
Same Preferred.....101		*101¼-103
Rayonier	13⅛	13⅜
Same Preferred.....	29¾	31
Scott Paper	38½	*38¾-39
Same 4½% Pfd.....110		*108-111½
Same 4% Pfd.....108½		*109¾-111
Union Bag & Paper....	9	10
U. S. Gypsum.....	68	74½
Same Preferred.....175		179

New York Stock Exchange—Bonds

Abitibi 5%	.....	.....
Celotex 4½% 101⅜		101¼
Certain-teed 5½%....100½		101
Champion P. & F. Co. 4½%	.....	.....
International Paper 5% 104½		104
Same 6% 106½		.....

New York Curb Exchange—Stocks

American Boxboard....	6½	.....
Great Northern	31⅜	.....
Hummel-Ross	3⅞	.....
St. Regis	3¼	3⅛
Taggart	4⅞	4¼
United Wallpaper.....	2⅛	2⅝

*Closing Bid and Asked Prices.

POWELL RIVER CO. REMEMBERS ITS SERVICE EMPLOYEES

At the outbreak of World War II, almost one-third of the employees of Powell River were veterans of World War I. For over 25 years, the absorption of ex-service men had been a definite part of the company's employment policy. The management cooperated in all movements and contributed to any welfare launched for the benefit of ex-service men.

When the first group of Powell River employees arrived overseas after Pearl Harbor, the company arranged for the despatch of regular shipments of cigarettes to these boys every three months. Today, there are nearly 300 Powell River employees overseas and to these men alone the company sends 750,000 cigarettes annually, or 2,500 per man. In addition, 500 cigarettes are mailed for Christmas to every employee stationed in Canada and serving with the Armed Forces.

The company also has established another feature which has kept contact with its absent employees. A monthly news letter is sent to its service employees, and the company believes it is one of the few, if not the only Canadian firm, that publishes regularly such a letter.

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FOREMEN FINISH PLANT INSTRUCTOR TRAINING

On November 17, foremen and superintendents of the Consolidated Water Power and Paper Company, Wisconsin Rapids, Wisconsin, were honored at a dinner meeting on the completion of the plant instructor training courses which have been conducted through co-operation of local and state vocational training agencies.

These courses in foremanship training, conducted by Charles Pagnucco, of Milwaukee, have depicted the most recent and advanced methods of training new employees.

J. J. Plzak, claims manager at the Consolidated company, presided at the banquet. Mr. Plzak has been active in arranging for these courses, through the several boards of education and vocational training.

George W. Mead, president of Consolidated, spoke on the trend toward proper personnel training, and Stanton W. Mead, director of manufacture, congratulated the men on the work accomplished. Leo J. Barrette, personnel manager of Consolidated, also offered congratulations to the men. Division managers made brief remarks and presented certificates to the men showing completion of the course.

Guest speakers at the banquet were W. A. Sprise, director of Witter vocational school, who collaborated in arranging these courses in several industries of the community, and John Tepoorten, co-ordinator of vocational and adult education for the State Department of Vocational Training.

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CANADA ISSUES PAPER CONSERVATION ORDER

Through an order which became effective December 1, the Canadian Prices Board has moved to conserve supplies of print paper and wood fiber products for use only by the armed services and essential civilian services.

The order does not affect distribution of print paper used for newspapers or other publications already restricted by previous orders.

Here, in brief, is the effect of the new regulation:

a) A permit for purchase and use of printed matter must be obtained by any person who bought in 1942 or in any 12-month period thereafter for use in his business, more than five tons or $2,400 in value of the kinds of printed matter permitted by the order.

b) A permit must be obtained by anyone proposing to buy more than $100 worth of printing if he has on hand more than a year's supply of that particular kind of printed matter.

c) Calendar and book manufacturing is made subject to permit, with jumbo-size and multisheet calendars prohibited.

d) Printing of business reply postcards and business reply envelopes and blotters is prohibited, although the envelope designed for both original use by the sender and return by the addressee may still be printed.

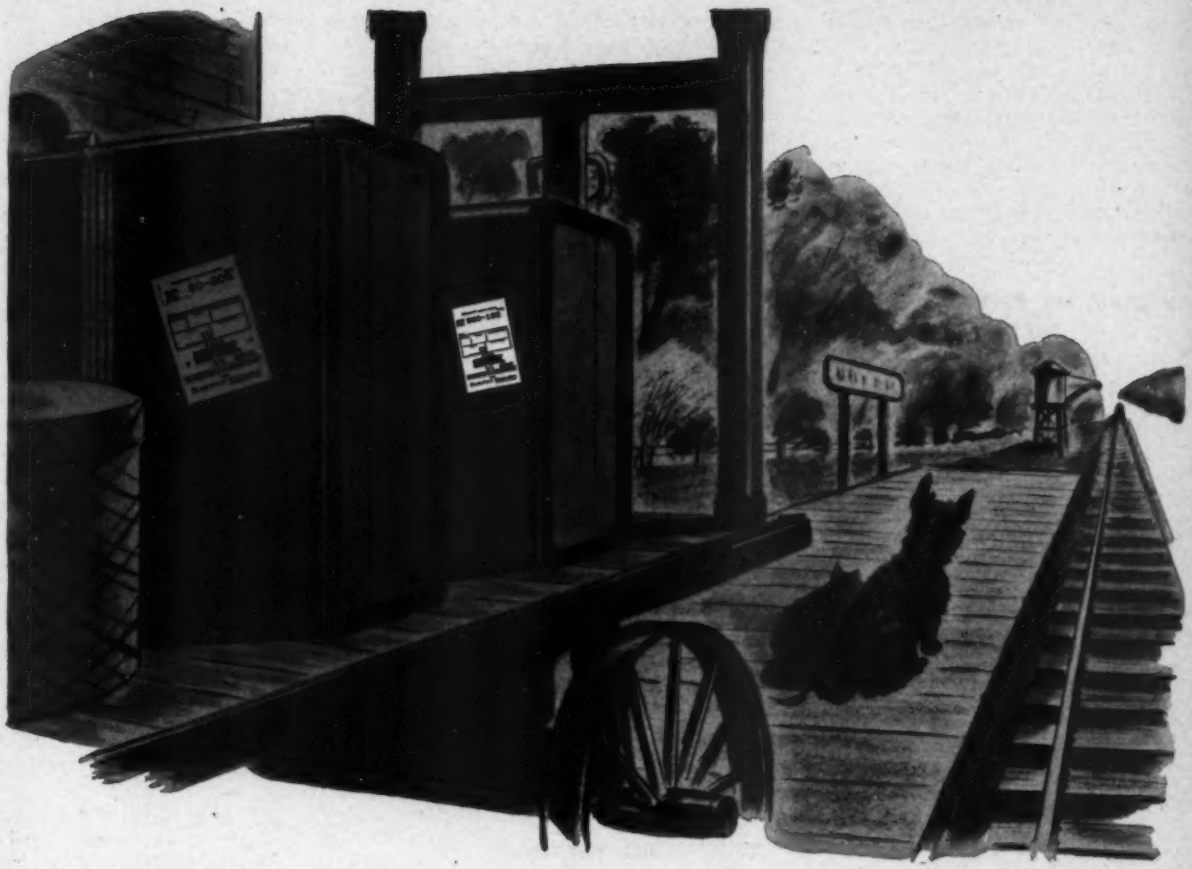
e) Twenty-four sheet posters for display on billboards, and street car advertising cards may be manufactured. But, posters, cards or bills advertising an event for which admission is charged may be displayed only in the place of entertainment on a 24-sheet poster panel or on a public conveyance.

f) The amount of paper for the manufacture of greeting cards is cut to 50 per cent of the tonnage used in 1942.

Listed exemptions are:

Printed matter purchased for personal use and not for the use of a person in his business.

Printed matter for the exclusive use of organizations which in the opinion of the administrator are religious, charitable, scientific, educational, political, professional, labor or others nonprofit in character, provided it is not in itself, or does not contain, the



HOW COLOR CANCELS COLLECTION ERRORS

PUBLIC relations are mighty important to a company that directly serves the public. So Railway Express Agency sought a way to combat the occasional embarrassing duplicate collection of express charges from the consignee on *prepaid* shipments.

They came to the same solution industry, business and commerce have long learned to depend on:

The use of colors to spot quickly and identify accurately

From the one-man office to the largest warplant, color serves today with distinction. On record forms, tags, labels, job tickets and orders, color speeds processing, production and distribution—minimizes errors, provides quick, accurate identification. Color, too, can speed the training of new employees and help veterans step up their output.

But paper and dyestuffs should be selected carefully—*teamed together to do the best job*—the most economical job.

Today, new paper products, new paper specialties and new wartime uses of paper and color are a challenge to you—a challenge that Du Pont Technical Service men will help you accept. They can help you unite paper and color most effectively—most economically. Call on them. E. I. du Pont de Nemours & Co. (Inc.), Organic Chemicals Department, Dyestuffs Division, Wilmington, Delaware.

Keep on Buying War Bonds!

DU PONT DYESTUFFS

REG. U.S. PAT. OFF.

DYESTUFFS

BETTER THINGS FOR BETTER LIVING . . . THROUGH CHEMISTRY

advertising of a person other than the publisher.

Printed matter required by law or manufactured under a contract with the Dominion or with any provincial or municipal government or any agency thereof; printed matter acquired for resale at retail or wholesale; maps, charts, graphs, patterns or music which does not contain advertising.

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PAPER IN BRITAIN'S FIFTH WAR YEAR

Christmas cards in Britain will be 50 per cent lighter than last year's "Austerity" cards, according to the British Information Services. There will be fewer cards and no card may weigh over two-fifths of an ounce.

The British Postmaster General has prohibited the sending of Christmas cards and calendars to prisoners of war in Europe, since those sent last year caused congestion in enemy censorship and greatly delayed ordinary letters. Relatives and friends are not expected to send additional Christmas letters instead of cards.

The quantity of paper available in Britain is about one-fifth of the pre-war supply, and many paper uses have been restricted or prohibited.

The Ministry of Supply restricts manufacturers of diaries to 25 per cent of the paper consumed in 1939, and restricts the weight of calendars to 1 ounce, except daily block calendars or perpetual calendars, for which the maximum weight is 1½ ounces. The order does not apply to diaries and calendars to be made up next year.

In order to save a large amount of good quality paper, the general post office has decided to abolish advertisements in stamp books. In the future, interleaves to prevent the stamps sticking will be made of inferior quality paper unsuitable for commercial printing. Official slogans will be used instead of advertisements.

◆

FIGHT PAPER WASTE

The third winter of the War brings intensified labor and material shortages. The shortage of paper and paper products has brought about a nation-wide intensive campaign for conservation and salvage. These programs are sponsored by the WPB and are being carried on by a number of national organizations and local groups.

In outlining its program for the conservation and salvage of paper, the Conservation and Salvage Divisions of the WPB have featured the slogan "Fight Paper Waste."

Prominent among the national bodies enlisted to fight paper waste and to conserve the use of paper is the U. S. Victory Waste Paper Campaign, promoted by the American Newspaper Publishers Association. Edwin S. Friendly, chairman of the Newspaper Committee of this organization, called upon the nation's wastepaper dealers to render all the advice and assistance they can to the newspapers in the nation-wide waste paper collection campaign which started December 6. The goal of the drive by the newspapers, similar to the 1942 scrap metal campaign and the current "Cut a Cord of Pulpwood" effort, is the collection of 2,000,000 additional tons of waste paper to put back into full production 25 mills now entirely shut down, and 100 operating only part time.

Rex Hovey, director of the Paper Division of the Forest Products Bureau, states that waste paper collections should be increased 20 per cent above present levels. He states that if waste paper collections can be increased by about 200,000 tons per month, the fear of further reductions in the use of paper may be eliminated.

Steps are being taken to guarantee prices to be paid by paper mills at OPA ceilings for properly processed waste paper until February 15, 1944.

◆

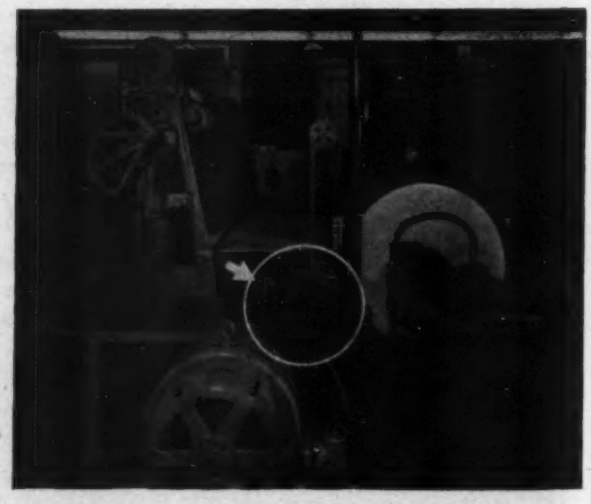
NEW WEB TENSION CONTROL INSTALLED AT SOUNDVIEW PLANT

At the plant of the Soundview Pulp Company, Everett, Washington, a new web tension control has been put into operation in connection with a Cameron Type 18 Rewinder, rolling specialty pulp.

This new device employs compressed air to adjust braking friction on the mill roll. The small valve shown close to the arrow inside the circle of the accompanying illustration is the heart of this device for governing the amount of tension or braking on the mill roll and keeping it uniform from the start to the finish of the run. The valve can be set for the particular type of stock being handled and from then on it will govern the amount of braking required as the roll rewinds.

Compressed air links the control valve with the brake mechanism. Air from the valve is fed into the diaphragm, which activates the brake mechanism. Ahead of the automatic valve is a cam, which controls the opening and closing of the valve to govern the amount of air fed into the brake diaphragm.

The parts were taken to the Soundview mill for the first mill installation by Joe Scheuermann, western sales manager, and Tom Carter, service engineer of the Cameron Machine Company, Brooklyn, whose combined efforts developed this new automatic tension control.



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VICTORY PULPWOOD CONTEST SUCCESSFUL

The Victory Pulpwood Campaign contest recently closed after three months of competition for $3,000 in prizes. Participating in the contest were more than 1,600 weekly and small daily newspapers in 27 pulpwood producing states in the Northeast, South, Appalachian and Lake States. More than 1,200 local pulpwood committees have been formed and are conducting community and county drives to avert a threatened 2,500,000-cord pulpwood shortage this year.

The first prize of $1,000 in war bonds went to Sattis Simmons, publisher of the *Jackson Herald*, Ripley, West Virginia, for his slogan "Cut-a-cord of Pulpwood for Every Local Boy in the Armed Service," which helped him to carry through a successful county-wide plan. As a result of the local pulpwood campaign, Mr. Simmons states a new industry was started in Ripley. The West Virginia Pulp and Paper Company considers future production possibilities so promising that it has arranged for car sidings and a yard where pulpwood is paid for in cash on receipt. →

On many production lines, the grinding, boring, drilling, and milling of innumerable parts and equipment play a vital part in the production of war materials. Called upon by many of the machine tool makers to furnish and machine castings such as: bases and tables for grinding machines, milling machine bases, parts of horizontal boring mills, multiple spindle drills, and other equipment, we are utilizing all of our skill in fulfilling these assignments with the exacting standards that have always demanded no compromise with quality.

Jones

GEARED FOR WAR PRODUCTION

E.D. JONES & SONS COMPANY-PITTSFIELD, MASS.

Builders of Quality Machinery for Paper Mills

The second prize of $500 in War Bonds went to Walter B. Chilsen, publisher of the *Merrill Daily Herald*, Merrill, Wisconsin, for developing a complete promotion program which included essay contests in schools, field meetings of farmers and woodsmen, a Victory Pulpwood Parade, and enlistment of the churches.

For reviving the mythical giant of the forests, Paul Bunyan, in person, and promoting the pulpwood campaign in special features and at county fairs, Paul A. Anderson, editor and publisher of the *Daily Journal*, International Falls, Minnesota, won the third prize of $300 in War Bonds, while the fourth prize of $200 in War Bonds went to William P. McGuire, president and editor of the *Southside Virginia News*, Petersburg, Virginia, for his solicitation of government recognition of the seriousness of the rural manpower situation.

Walter M. Dear, chairman of the Newspaper Pulpwood Committee which sponsored the contest, stated that the conclusion of the contest does not terminate the Pulpwood Campaign. On the contrary, the campaign will be given greater emphasis this month with the slogan created by Mr. Simmons.

◆

500 WAR PRISONERS TO WORK IN FORESTS OF NORTHERN NEW YORK

An arrangement has been effected between representatives of the pulp and paper industry and the War Manpower Commission and Army Officers to send 500 Italian war prisoners into the forest of Northern New York to help get out wood. Before the prisoners are put to work, they will be given a course of instruction in woods operations at Pine Camp in Northern New York.

A partial list of company requirements is as follows: Finch, Pruyn and Company, Glens Falls, 30; West Virginia Pulp and Paper Company, Pleasant Lake, 25 and Jersey Field Lake, 25; Gould Paper Company, McKeever, 30; Johnston Pulp Company, Port Leyden, 75; Moose River, 100; Elliott Hardwood Company, Potsdam, 20; Newton Falls Paper Company, Newton Falls, 50; and Emporium Forest Company, Conifer, 10. Other requests brought the total to 500.

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▶▶▶ A NEW WAREHOUSE is being constructed by the John Strange Paper Company, Menasha, Wisconsin, to replace the 75-year old structure destroyed by fire recently. The new building will be considerably smaller than the one destroyed.

Washington News

BOREN COMMITTEE ADDRESSES LETTER TO THE PRESIDENT

▶▶▶ WITHOUT following the usual procedure of reporting to Congress, the Boren Committee has addressed a letter directly to the President, in which it was stated that "the co-operation received by this Committee from the various agencies of Government has not been all that might have been expected." Particular attention was called to failure of the War Manpower Commission and Selective Service to co-operate with each other to secure the much needed additional labor for pulpwood cutting. The Committee letter then suggested the following steps to alleviate the situation:

1) That the Selective Service give greater consideration to the deferment of skilled woodsmen.

2) That War Manpower Commission provide for the return and reassignment to forests of wood cutters now working in less essential occupations.

3) The use of prisoners of war in pulpwood production wherever possible.

4) Furloughing from military service of a sufficient number of woodsmen to guarantee necessary pulpwood production.

5) Use of the President's office in obtaining from Canada co-operation in increasing pulpwood and paper production in the Dominion.

6) A national appeal to American farmers to assist in cutting wood from their own woodlots and in nearby forests.

7) A nation-wide campaign for paper conservation.

8) Expansion of the present salvage campaign.

The President has notified the Committee in reply to Mr. Boren's report that Canada has consented to allow 3,500 woodsmen to work in the northeastern states.

The Committee has held additional hearings, both in the Oklahoma-Texas and Minnesota regions, and at Washington to clear up the loose ends before making its final report, and several briefs have been filed by government officials, outlining recent developments and telling of immediate plans for the future.

Whether or not inspired by the Boren Committee recommendation, the Conservation Division of the War Production Board is initiating an intensive campaign for conservation, and is co-operating with the industry to increase salvage efforts.

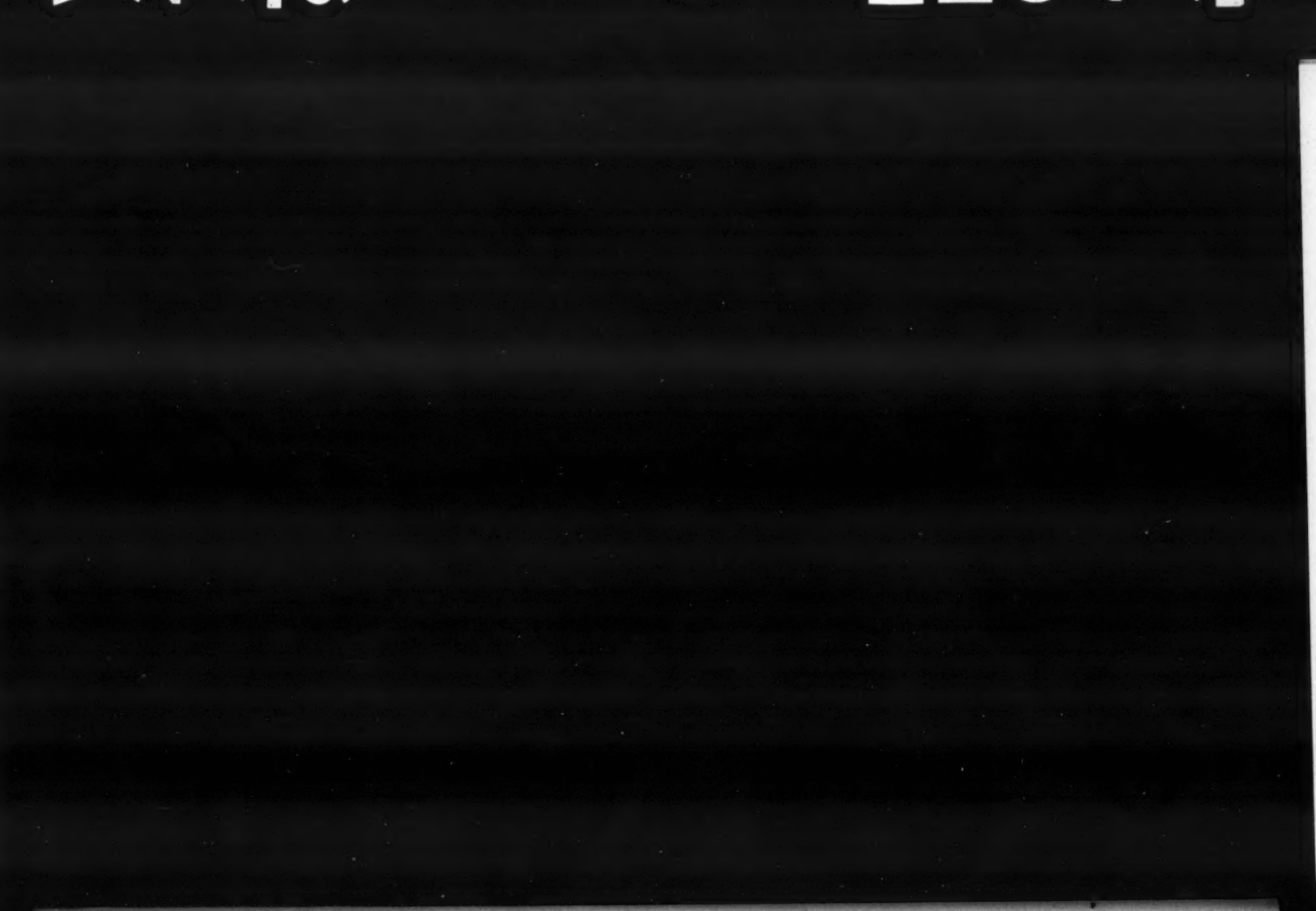
Meanwhile, as a further result of the Boren Committee hearings, a Newsprint Manufacturers Advisory Committee has been named to conduct studies into the proposal to permit the duty free entry of 30-pound newsprint from Canada. A joint committee of Canadian and War Production Board officials has suggested as one possibility the allowing of free importation of paper carrying more clay than is customarily used in newsprint.

In all the hearings emphasis has been placed on the needs of the newspaper publishers for an adequate supply of paper, and little consideration has been given to the fact that the proposals ostensibly intended to meet newspaper needs threaten the loss of protection to the American groundwood and book paper mills.

An even more stringent control of pulp allocation than has been practiced in the past will go into effect Jan. 1, and under the new plan pulp will be allocated more specifically on the basis of the end use of the paper, and whether such uses are essential to the war effort. In filing requests for pulp, the mills must henceforth indicate the ultimate use of all grades of paper which they manufacture. To secure such data it will be necessary for customers to report to the mills the manner in which the paper is to be used. The allocation will then be made on the basis of providing pulp for mills making essential papers as prior claimants, and the remainder of available pulp, if any, will be allocated for other papers in the assumed importance of their use by civilian consumers.

While all these developments are under way, the paper industry is continuing to stress the need for a different attitude on the part of Washington than that which is currently believed to exist. Instead of devising means for dividing up a scarcity, the industry is continuing its efforts to convince Washington that the real need is for the procurement of sufficient pulpwood to meet existing needs. If the pulpwood is produced, the mills can provide all the necessary paper for government and civilian use.

A bill introduced by Congressman Boren to centralize the purchase of all paper for the Government in the Government Printing Office is not likely of passage.



Now it can be told!

On Battle Ships—in Far Distant Islands—in the African Campaign—in Alaska—GRUENDLER Equipment in the War as in peace time, is doing an important job, a big job. New developments in Equipment Efficiency have been made and will be announced Post War.

LET US ALL WORK FOR VICTORY NOW

Garbage and Refuse Shredders for U. S. NAVY

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This is a full-rate Telegram or Cable-gram unless its de-ferred character is in-dicated by a suitable symbol above or pre-

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SYMBOLS

DL=Day Letter
NL=Night Letter
LC=Deferred Cable
NLT=Cable Night Letter
Ship Radiogram

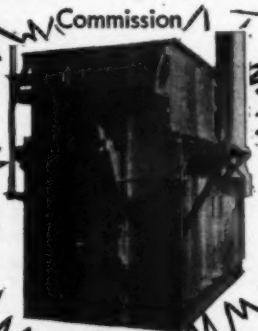
GLONGWUAJ92 GOVT LG=CT WASHINGTON DC SEPT 29 1208P

TO THE MEN AND WOMEN OF GRUENDLER CRUSHER AND PULVERIZER CO=

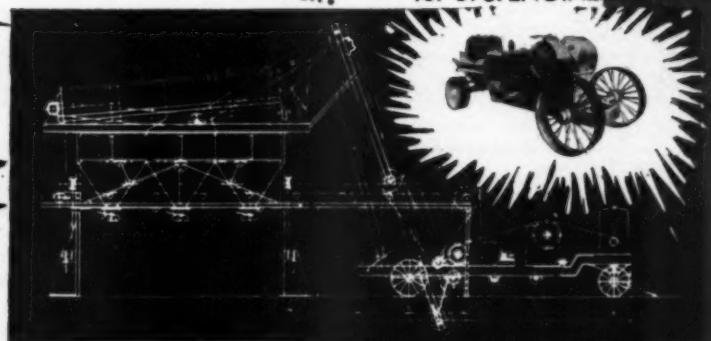
:A US AIRCRAFT CARRIER, WHICH HAS STEAMED OVER 111,000 MILES ON VITAL MISSIONS DURING THE PAST TWO YEARS, REPORTS THAT YOUR GARBAGE GRINDER, CRUSHER AND PULVERIZER FUNCTIONED EFFICIENTLY AT ALL TIMS. THE SAFETY AS WELL AS THE CLEANLINESS OF A SHIP DEPENDS IN NO SMALL MEASURE ON THE PROPER DISPOSAL OF GARBAGE .YOUR EQUIPMENT, IN DISPOSING OF GARBAGE WITHOUT A TRACE, IS VITAL TO OUR SHIPS OPERATING IN SUB-INFESTED WATERS=

E L COCHRANE REAR ADMIRAL USN CHIEF OF THE BUREAU OF SHIPS. 1152A.

Armor Plate Plastic Mixers for U. S. MARITIME Commission



Portable Crushing Plants for U. S. ENGINEER CORPS



BUY WAR BONDS

GRUENDLER

CRUSHER & PULVERIZER COMPANY

ENGINEERS and MANUFACTURERS for over HALF CENTURY

▶▶▶ THE ALLOCATION OF wood pulp on a quarterly basis is a new order effective January 1, 1944. Heretofore WPB has allocated wood pulp on a monthly basis. This change is covered by an amendment to General Preference Order M-93, issued November 30.

UNUSED BOOK PAPER MAY BE CARRIED OVER INTO 1944

Books published in 1944 may weigh less per copy because of being printed on thinner paper, the WPB announced on November 12. It was stated, however, there is no indication that less reading material will be available as the use of more type on the page, narrower margins, and the use of lighter-weight paper are expected to help offset a foreseen curtailment in the permissible consumption of print paper by book publishers next year.

A later statement from the Book Section of the WPB Printing and Publishing Division announced an amendment to Order L-245 (under which book publishers operate) which provides that book publishers are now permitted to carry over into 1944 certain unused portions of their print paper quotas which they were unable to use during 1943, provided they notify the WPB Printing and Publishing Division prior to December 31, 1943.

▶▶▶ THE WAR PRODUCTS DEVELOPMENT Section, formerly a part of the WPB Pulp and Paper Division, has been designated the Technical Staff, and assigned to the Paper Division, under Rex W. Hovey, director. Administratively, it is set up on a parallel with the assigned staff and the joint Forest Products Bureau staff, composed of the Distribution, Labor and Transportation Section, and will report directly to the Division Director. This announcement was made December 4 by R. J. Zaumeyer, chief of the Technical Staff.

AMENDMENT PERMITS HEAVIER PAPER WTS. THAN ORDER L-120

An amendment to Commercial Printing Limitation Order L-241 was issued November 19 by the WPB Printing and Publishing Division. This amendment authorizes the manufacture of specified weights of paper for art reproductions, corporate securities, checks, domestic and foreign currency and telephone directory covers.

As the weights of the above types of paper already were limited by Order L-120 covering simplification and standardization of paper and paperboard, some confusion has arisen in the paper trade regarding the types of paper mentioned. However, the amendment provides that in these specific cases heavier weights than are permitted by L-120 may be produced. The maximum paper weights permitted are: Art reproductions, without advertising, in sheets 25x38—120 pounds; corporate securities, checks and currency, 17x22—24 pounds; and telephone directory covers, 22½x28½—110 pounds.

All other basic paper weights specified in List A of Order L-241 may be manufactured only in the grades in which they are permitted under the relevant schedules of Order L-120.

ANOTHER CUT RECOMMENDED FOR PRINTING PAPER USERS

The Commercial Printing and Lithographing Industry Advisory Committee announced on December 6 that it recommended all printing paper users —newspapers, magazines, books, and commercial—operate in 1944 on 75 per cent of the print paper used in 1941.

This move was made after a committee meeting on December 2 when the seriousness of the present paper situation was stressed.

The Committee also urged that every printer and buyer of printing, small or large, cut out for the duration French folds, overhang covers, bleed pages, blank interleaving pages and other fancy, uneconomical uses of paper.

A recommendation to standardize all paper on a 25x40—1,000 sheet basis was adopted by the Committee.

RESERVE PRODUCTION PERCENTAGES CHANGED

Rex W. Hovey, director of the WPB Paper Division and G. G. Otto, director of the Paperboard Division, made the following statement Nov. 16:

Effective December 1, 1943, and until otherwise directed, each manufacturer of paper or paperboard shall, instead of the 10 per cent reserve fixed by paragraph "D" of Order M-241, reserve in each calendar month in the production of each of his mills, time and supplies sufficient to produce and deliver within such month the following percentages of the mills' finished production: Paperboard, 50,000 to 59,000 inc., 35 per cent; Paper (all other captions), 15 per cent.

This is the first change in reserve production percentages made by the WPB since Order M-241 was revised on October 16 authorizing increases of paper and paperboard reserve production, especially as effects governmental orders.

LATHE ATTACHMENT DEVELOPED IN CAN. MILL MACHINE SHOP

A lathe attachment for machining spherical parts has been designed by Ludger Perron, of the machine shop of Consolidated Paper Corporation, Port Alfred, Quebec. This device constitutes an automatic feed covering a range of 90 degrees. It is very precise in eliminating the human factors involved and can be adapted to many uses.

The device was developed to machine spherical ends on air-pump crossheads for 10,000-ton cargo vessels which the shop was making for Dominion Engineering Works, Ltd., Montreal. At the present time, the same attachment is being used to machine bronze spherical balls for sulphite triplex pumps.

◆

NEWFOUNDLAND WILL SHOW NEWSPRINT DECLINE IN 1943

Newfoundland newsprint output in 1943 will show a decline of more than 30 per cent from the 1942 tonnage based on production reports for the first five months of this year.

Two factors responsible for the sharp decline on the island are the shipping shortage and lack of manpower. Losses to both manufacturing companies' shipping due to enemy action, and similar losses to chartered shipping have reduced the number of bottoms available for paper transport. Extensive defense work carried on by the United States and Canada in Newfoundland have drained the labor supply normally occupied in the paper mills and wood-cutting activities.

The beginning of 1943 saw the mills with large stocks of finished newsprint on hand, and consequently shipments at the end of July showed a total of 136,070 tons—19,000 tons in excess of production for that period.

Drop in paper shipments was almost entirely at the expense of the United States market which took only 91,527 tons for the January-July period against 111,294 tons for the same period in 1942. A small gain was made in newsprint shipments to the United Kingdom—43,967 tons as compared with 41,793 tons.

The Bowater's mills are now operating on short time in its manufacturing departments. In 1942 both paper mills showed profits at half that of the previous year.

Both the Grand Falls and Corner Brook mills are producing sulphite pulp for military purposes, and additional facilities were provided for this purpose.

THANKS TO CHEMISTRY—Industrial Chemistry has helped create history's finest safeguards for military personnel. Wyandotte Chemicals Corporation services half a hundred industries with materials vital to war . . . and peace.

Wyandotte
Offices in Principal Cities

Wyandotte Chemicals Corporation consolidates the resources and facilities of Michigan Alkali Company and The J. B. Ford Company to better serve the nation's war and post-war needs.

WYANDOTTE CHEMICALS CORPORATION, MICHIGAN ALKALI DIVISION • WYANDOTTE, MICHIGAN

Soda Ash • Caustic Soda • Chlorine • Bicarbonate of Soda • Calcium Carbonate • Calcium Chloride • Dry Ice • Aromatic Intermediates • Hydrogen

A section of the 64-car Victory Pulpwood Special which rolled into International Falls, Minn., during the Victory Pulpwood Festival which highlighted the pulpwood cutting campaign in Minnesota.

VICTORY PULPWOOD FESTIVAL HELD AT INTERNATIONAL FALLS

A colorful Victory Pulpwood Festival at International Falls, Minnesota, marked a milestone in the national pulpwood campaign. Governor Edward J. Thye, of Minnesota, participated in the event which drew visitors from Canada and all parts of the Northwest.

The main feature of the Festival was the arrival of a 64-car pulpwood train destined for the mills of the Minnesota and Ontario Paper Company. The Governor, himself, piloted the train. A total of 135 carloads of pulpwood, in addition to numerous truckloads, reached the city during the Festival.

The Governor was clad in a lumberjack outfit, presented by the County Pulpwood Committee. He spent three days inspecting logging operations, visiting with lumberjacks, farmers, and labor representatives. He also inspected the M and O paper and Insulite mills, and took part in a civic Victory Pulpwood luncheon.

R. H. M. Robinson, president of the Minnesota and Ontario Paper Company, was a guest of Melvin Johnson, chairman of the county committee and a woodlot farmer himself. Both the Governor and Mr. Robinson addressed the luncheon guests. Tribute was paid to the *International Falls Daily Journal* which won national honors for its promotional work in connection with the Victory Pulpwood Campaign.

Official approval was given this pulpwood cutter's saw by Governor Edward J. Thye of Minnesota during a visit to Minnesota and Ontario Paper Company logging operations while attending the Victory Pulpwood Festival at International Falls, Minn.

◆

U. S. CHAMBER TO AID WMC PROGRAM THROUGH TRADE ASS'NS

An industry-wide drive through trade associations to achieve greater manpower utilization was announced November 29 by Eric A. Johnston, president of the United States Chamber of Commerce.

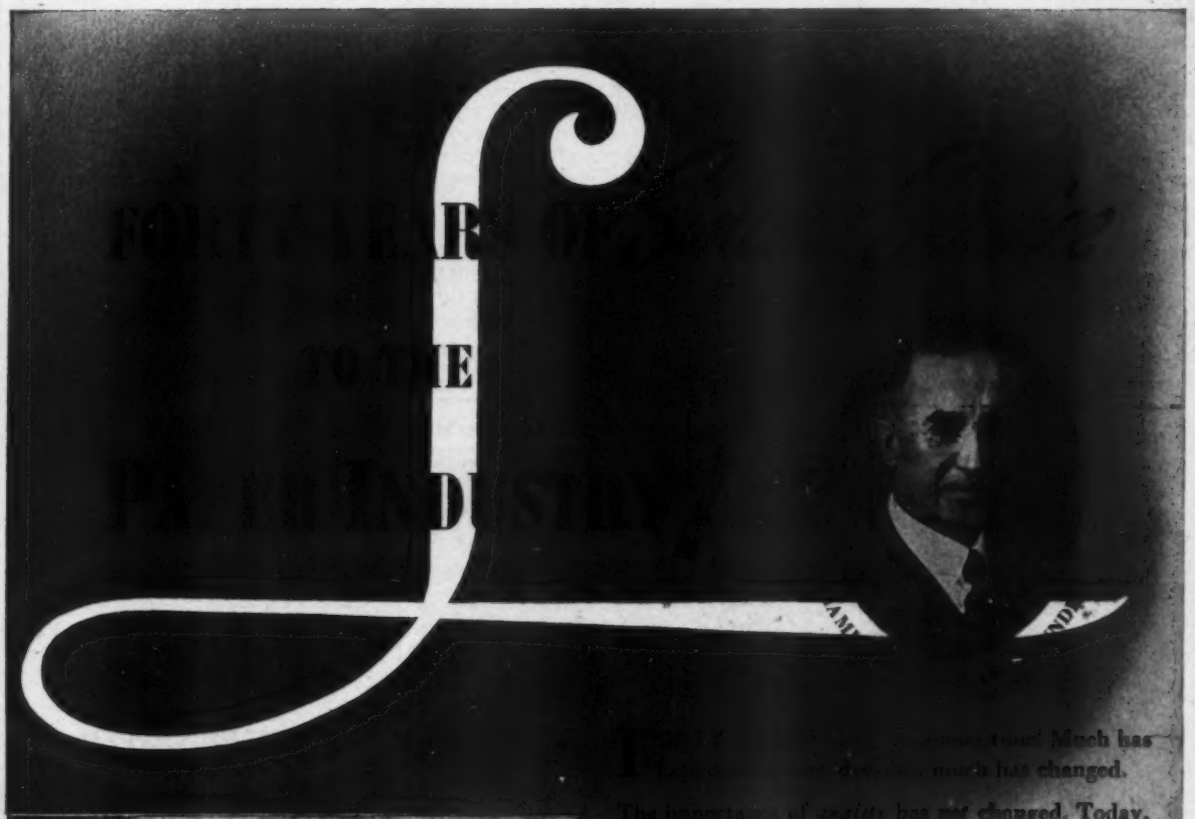
A War Manpower Commission utilization program was sent out to 1,300 trade associations, which Mr. Johnston described as a practical approach to the problem of reducing inefficient production.

The WMC outline contemplates three steps: (a) a report to the WMC on outstanding industry-wide manpower problems with suggestions for their correction; (b) identification and evaluation of measures adopted within the trade or industry resulting in savings or more effective use of manpower; and (c) presentation of information respecting such measures to the members.

◆

CANADIAN MILLS RAISED TO HIGHER CATEGORY

To help in meeting the insistent demands of the newsprint industry in Canada and of the users of newsprint in the United States for more manpower to increase pulpwood procurement, Labor Minister Humphrey Mitchell has announced that the pulp and paper industry would be raised from the "C" to the "B" category in



Much has changed.

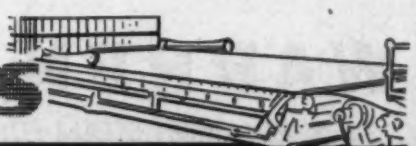
The importance of *purity* has not changed. Today, it is more paramount than ever. Year after year the quality of Fourdrinier wire cloth has improved in reference to mesh, seaming, selvedge, and the metal itself. Over-all, the width of Fourdrinier wires has nearly doubled to cope with new requirements as they arose, and special applications have been multiplied many-fold.

THE FIRST BUILDING . .

. . THE PLANT TODAY

Lindsay serves the paper industry exclusively. We have sought to contribute materially since 1903 to the progress of wire cloth manufacture and hence to the quality of paper. Forty years of such specialization necessarily create for us an obligation to do our part just a little better every day. Lindsay wire cloth will continue to uphold those ideals of excellence which were set for us by our founder.

THE
LINDSAY WIRE WEAVING COMPANY
Serving the Paper Industry Since 1903
14001-14299 ASPINWALL AVE. CLEVELAND 10, OHIO



Lindsay WIRES
FOR PAPER MILLS

the list of essential industries. The freezing process applied to the high category industries obviously will not be applicable in this case, as pulpwood cutting is an entirely seasonal occupation. These workers will be returned to their farms in the spring.

This higher category is one of the steps taken by the Government to insure an adequate supply of workers for the forests this winter. Another move recently made known was the planning of a high-powered publicity campaign through the press and over the radio to recruit men for the bush, and a third move has been the elimination of time-consuming formalities in the selective service machinery.

Satisfactory progress is being made in Quebec and Ontario in getting men into the bush. According to figures issued by the Department of Labor, 60,000 men already had responded in Quebec at the beginning of November, and it was expected that as many more should be on the job shortly.

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▶▶▶ HERETOFORE A DIVISION OF THE NORTHERN PAPER MILLS, the Tuttle Press Company of Appleton, Wisconsin, has been purchased by Appleton interests. No changes in personnel are expected to be made. The officers are: Roy H. Purdy, president, treasurer and general manager; W. E. Buchanan, vice president; and L. R. Watson, secretary.

◆

▶▶▶ ALL PERSONS CLAIMING INTEREST in trade-marks, commercial prints, or labels, now or formerly owned by nationals of designated foreign countries are required to report their interest, including any agreement or claims of ownership, on Form APC-31 by February 1, 1944. This announcement was made November 22 by Leo T. Crowley, Alien Property Custodian. Copies of Form APC-31 and instructions for reporting may be obtained through the Office of Alien Property Custodian in Washington, New York, Chicago, and San Francisco. A second order, No. 28, requires the reporting of royalties due and payable to the Alien Property Custodian with respect to interests already vested by the Custodian in trade-marks, commercial prints and labels, and agreements relating thereto.

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MORE HANDICAPPED PERSONS EMPLOYED

Some interesting figures have been released by the Office of War Information with regard to placements of handicapped persons by the United States Employment Service.

The total number of handicapped persons who have found employment this year through the United States Employment Service is 139,862 as compared with 60,932 for the same period in 1942. In some states the percentage of increase has been over 1,000 per cent. It is notable that the percentage has risen most sharply in labor shortage areas where the War Manpower Commission has insisted upon the highest utilization of the available labor supply.

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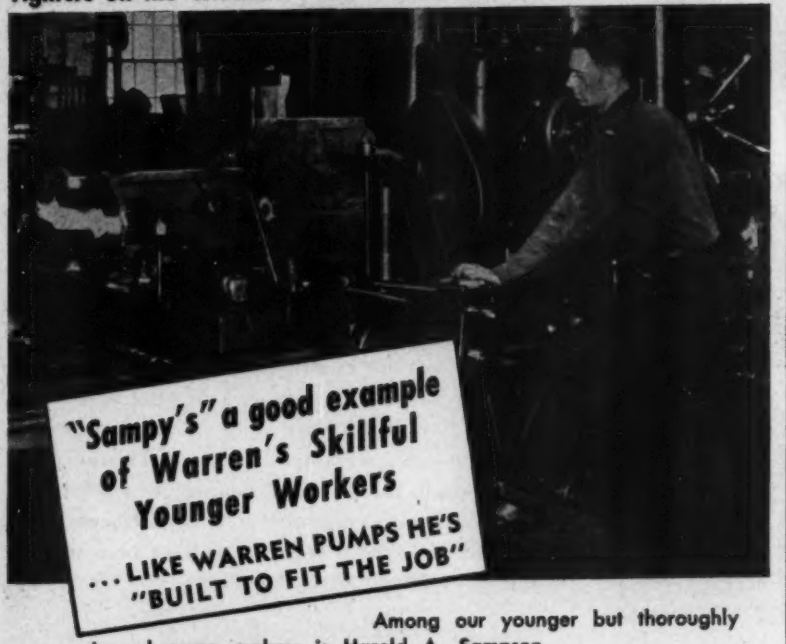
▶▶▶ TO MEET PROBLEMS arising from a critical shortage of pulpwood, the Canadian Wartime Prices and Trade Board announced on November 12 a new order empowering the pulp administrator to control the kinds, standards, qualities, quantities, deliveries and shipments of wood pulp, particularly for export trade. The announcement stated the order was designed to prevent available supplies of wood for pulp being used faster than the administrator feels is expedient. As use of wood pulp in Canada already is controlled, officials said the order has "particular application to the control of wood pulp for export."

Fighters on the WARREN PUMP Production Front. No. 7 of a Series



Among our younger but thoroughly experienced pump makers is Harold A. Sampson.

"Sampy", who operates a Horizontal Boring Mill, handling pump casings and other parts up to 30" sizes, has 14 years of Warren Pump experience behind him. He takes as deep pride in turning out the quality pumps that "are built to fit the job" as the skilled Warren Pump Makers who have been on the job for 20, 30 or even 40 years.

It is this pride that these skilled men take in Warren Pumps that enable Warren equipment to perform so faithfully in the gruelling 24 hour duty demanded in war plants or the do-or-die duty asked for in the United States Navy, Coast Guard and Merchant Marine. It is this pride that enabled these Warren Workers to win the Army-Navy "E" Award.

WARREN PUMPS

WARREN STEAM PUMP COMPANY, INC.

WARREN, MASSACHUSETTS

DON'T LET YOUR BOILERS DOWN!

Under wartime conditions, many boiler installations are working under an abnormal load, but they must continue to deliver with a minimum of time out for overhaul. Feed water that is exactly conditioned for your boilers will help reduce outage caused by corrosion, scale, embrittlement and carryover—will guard against costly failure.

Betz engineers and chemists know how to keep boilers operating 'round the clock. Years of experience with all types and sizes of installations and with widely varying feed waters enables Betz to render a boiler water service that is complete for all industries, with individual recommendations for each client.

Betz laboratories and engineers are located throughout the United States and Canada.

CHEMICAL ENGINEERS AND CONSULTANTS ON ALL WATER PROBLEMS

BETZ

W. H. & L. D. BETZ

FRANKFORD · PHILADELPHIA · PENNA.

. . . and drive even harder on the pay-roll savings plan!"

Make War Bonds the Christmas Order of the Day. Urge your workers to make their personal Christmas gifts in the form of War Bonds—and practice what you preach! Make this a 100% War Bond Christmas—to insure future Yuletides of peace and prosperity.

Make up your own posters to spread the "War Bonds for Christmas" story across your plant. Tell the story again and again on bulletin boards, in your plant magazine, and on pay envelope stuffers.

But don't forget your basic, all-important Pay-Roll Savings Plan. How's it going, these days? Perhaps it needs a bit of stoking-up right this very minute, to hold its full head of steam against the competitive demands of the holiday season.

Well, you're the man to stoke it! You can't expect it to keep running indefinitely on last summer's enthusiasm. See to it that your participation percentages, and your deduction percentages, *both* end up the year at new levels.

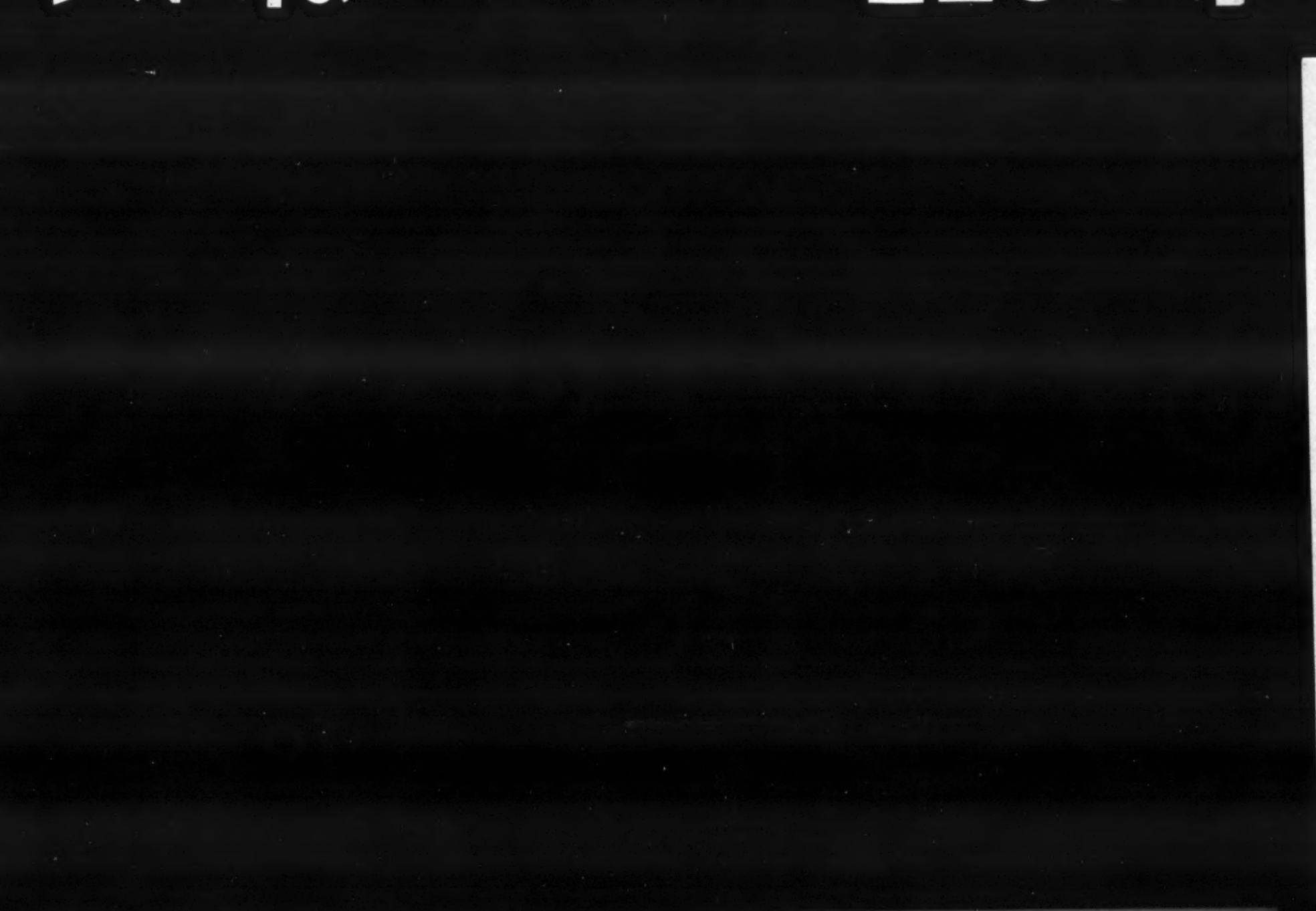
Every month, now your Pay-Roll Savings ought to run well ahead of the preceding month. *For so many families that formerly depended on the earnings of a single worker, now enjoy the combined earnings of several.* Such *family* incomes are doubled, trebled, even multiplied many times.

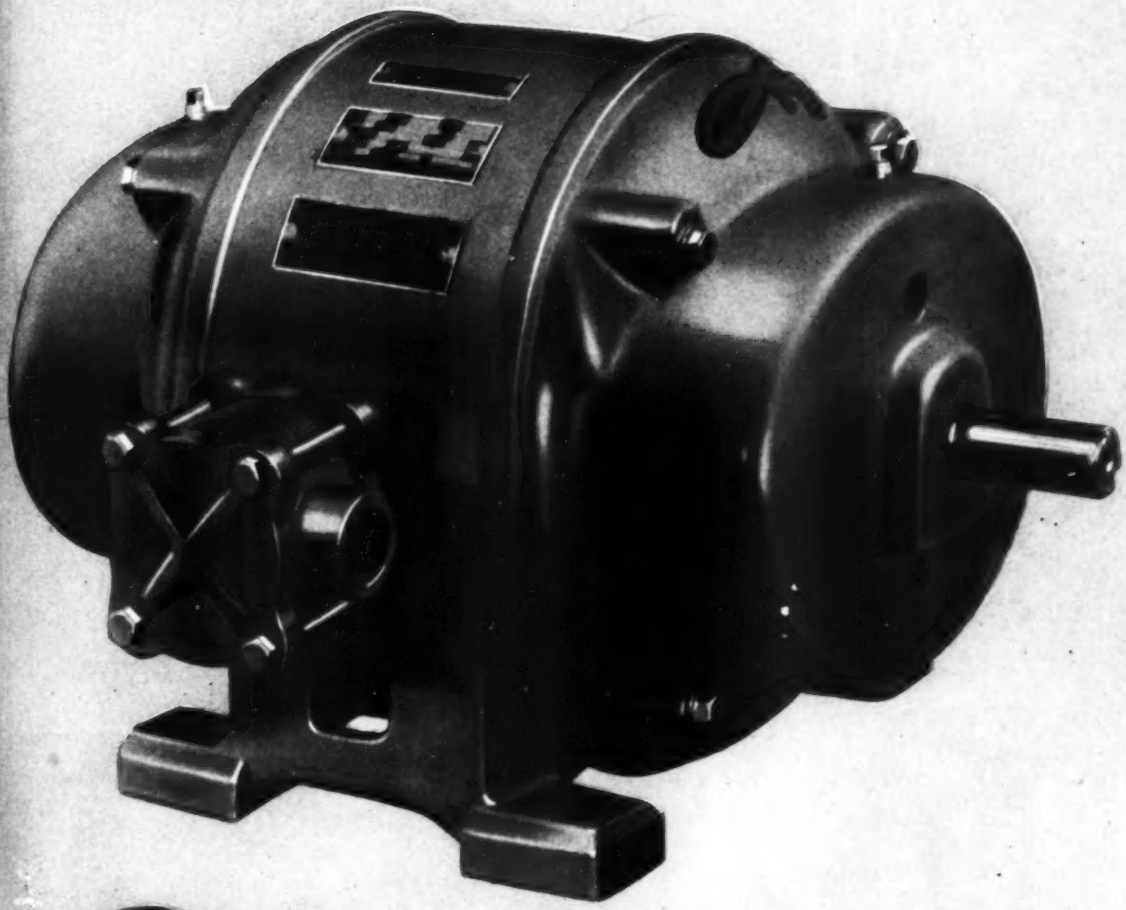
Now's the time to turn as much as possible of these increased earnings into War Bonds—War Bonds for Christmas . . . and War Bonds the whole year 'round!

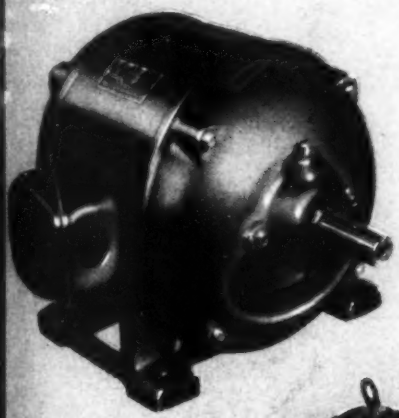
GIVE THE PRESENT WITH A FUTURE—WAR BONDS!

This space contributed to Victory by **THE PAPER INDUSTRY and PAPER WORLD**

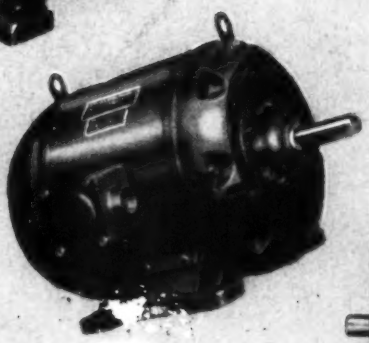
This advertisement prepared under the auspices of the United States Treasury Department and the War Advertising Council

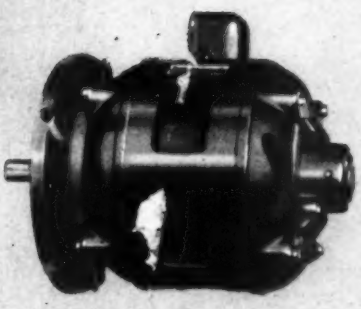


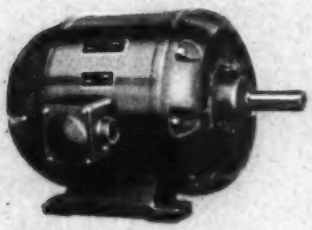




There is a size and type LOUIS ALLIS *electric motor for every industrial requirement.*







THE LOUIS ALLIS CO., MILWAUKEE 7, WIS.

Speaking of Electric Motors—

The day of trying to use a standard motor for a special job is about over.

Machinery designers, and production managers have learned that it is much more efficient and economical to obtain a motor with exactly the electrical and mechanical characteristics required to perform a specific job than it is to try to doctor up a standard "shelf" motor to do the job.

Speed and horsepower are no longer the major measuring stick of motor requirements — they are merely incidental to the many other characteristics available in electric motors today.

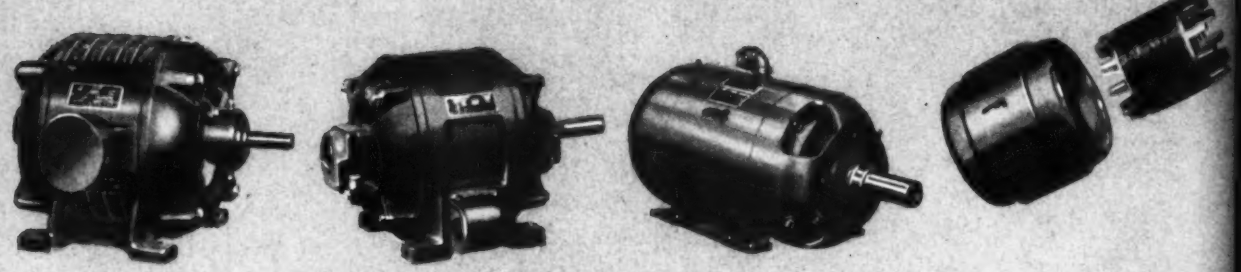
For over forty years we have been developing special motors for special jobs — our engineering department has a wealth of experience along this line —

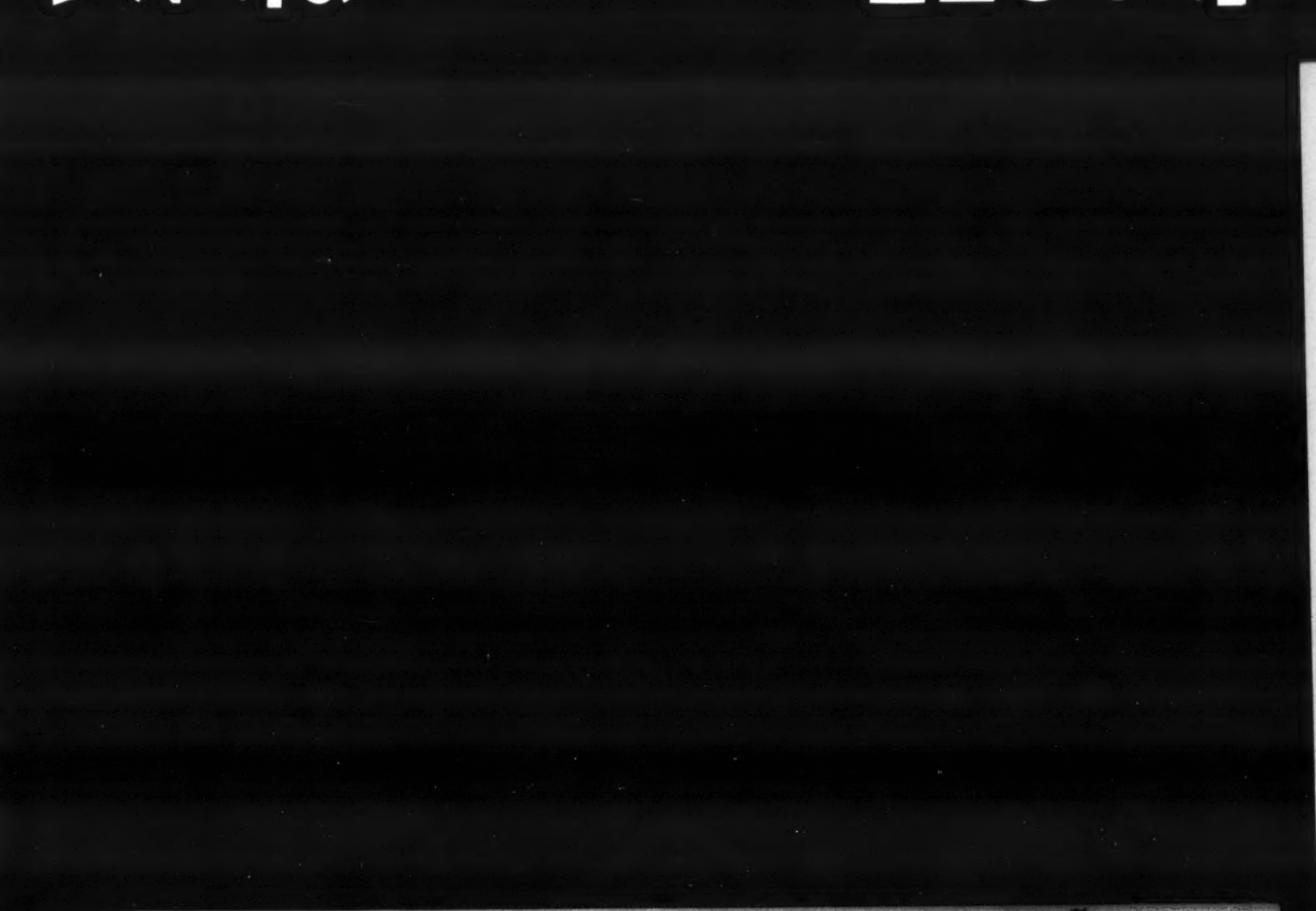
Right now special Louis Allis motors are serving a major important role in helping your boy and mine win this war — to help bring him back home — safely — and as quickly as possible.

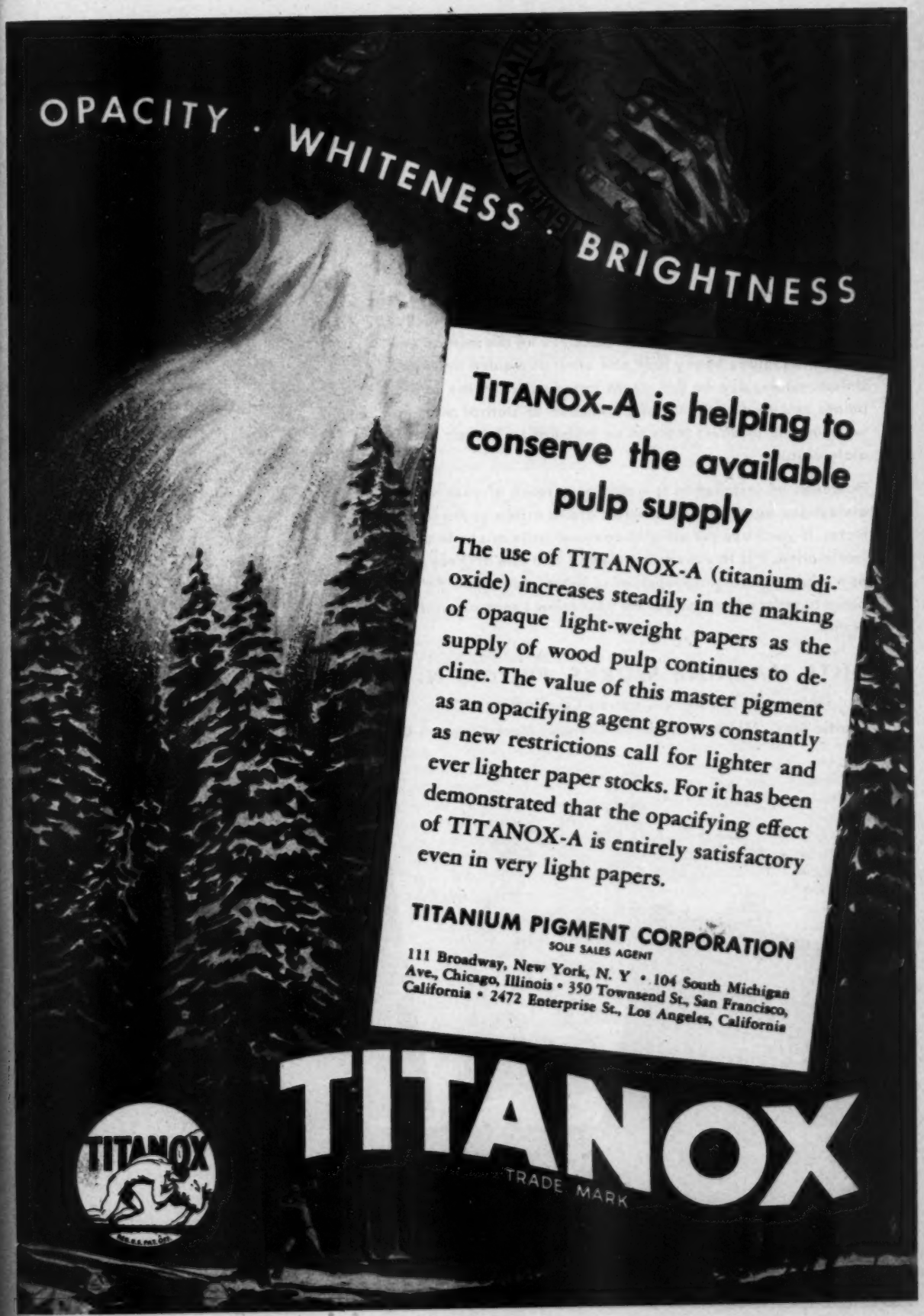
As soon as Uncle Sam does not so urgently need all of our facilities — your electric motor problems and requirements will receive our most prompt and careful attention in every way.

But right now — let's WIN this war!

THE LOUIS ALLIS CO., MILWAUKEE 7, WIS.






OPACITY . WHITENESS . BRIGHTNESS
TITANOX-A is helping to conserve the available pulp supply
The use of TITANOX-A (titanium dioxide) increases steadily in the making of opaque light-weight papers as the supply of wood pulp continues to decline. The value of this master pigment as an opacifying agent grows constantly as new restrictions call for lighter and ever lighter paper stocks. For it has been demonstrated that the opacifying effect of TITANOX-A is entirely satisfactory even in very light papers.
TITANIUM PIGMENT CORPORATION
SOLE SALES AGENT
111 Broadway, New York, N. Y • 104 South Michigan Ave., Chicago, Illinois • 350 Townsend St., San Francisco, California • 2472 Enterprise St., Los Angeles, California
TITANOX
TRADE MARK
TITANOX

GOOD NEWS TRAVELS FAST

Recently Jacksons Millboard and Fibre Co., Ltd., Bourne End, Bucks, England, cabled for particulars on the Dilts hydrapulper. GOOD NEWS TRAVELS FAST, and the hydrapulper *is* good news.

Complete information on the hydrapulper was forwarded to Jacksons and a description was given of its fast, effective action on whole bales of mixed stock . . . on the method employed to remove heavy junk and other unwanted materials. Unfortunately, due to the recent introduction of the hydrapulper and to curtailment of production at start of war, we were unable to direct them to an installation in their immediate vicinity.

However, an installation is within easy reach of your mill as almost one hundred hydrapulpers are in action in the United States. If you have not already done so, write or phone us for information. It is to your advantage to visit one of these mills now and inspect a hydrapulper in actual operation. Be prepared to order a hydrapulper for your mill as soon as priorities permit.

DILTS MACHINE WORKS, FULTON, N. Y.

Division of The Black-Clawson Co., Hamilton, Ohio

Shartle Bros., Middletown, Ohio, Division Black-Clawson Co.

. . . . . Editorial . . . . . .

The $64 Question!

▶▶▶ THERE IS BUT ONE big question which the paper industry finds difficult to answer and that is "What are you going to do about pulpwood"? Pulpwood is as essential to the operation of paper mills as iron ore is essential to the operation of steel mills. Without these essential raw materials, mills must close down.

But the steel mills are operating to capacity and will continue so to do. In fact, steel is now available for manufacture of luxury or nonessential commodities. That is because the Iron and Steel Institute (a setup within the steel industry, whose sole business is to protect the steel industry from stupid rulings and adverse legislation) proceeded to Washington immediately upon the declaration of war, and on behalf of the entire steel industry showed the War Production Board what essential steps it must take to protect the essentiality of steel production for the prosecution of the War. One of the first and most cardinal provisions pointed out was that the miners of ore must be kept in the mines and must be exempted from the draft. This was done and the full complement of miners are mining ore daily. Result: the war economy and essential civilian economy are amply provided with steel products.

Not so with the paper industry. It had no setup within the industry to speak authoritatively for the whole industry, such as the steel industry has. So, when war was declared, there was some protest forthcoming from the paper industry against the wholesale drafting of the woodsmen in the forests, by whose labor alone the essential raw material, pulpwood, is furnished the pulp and paper mills of America. But this protest lacked the necessary strength. Result: the wage-earning woodsmen, which numbered almost one million men in 1939, were preferred draftees, and such as went into the Armed Forces are scattered all over the world from the Solomon Islands around to Africa, Italy, and Asia. The balance of these competent foresters is scattered all over the United States in the high wage-paying defense industries from which they will not return for the duration, if then.

The crux of the paper crisis is the shortage of men to cut pulpwood. Again, we say, by way of dramatizing the crisis, no pulpwood, no pulp; no pulp, no paper; no paper, no war.

Paper is THE essential commodity on every active front.

Activity is life, and paper is the essential factor in activity.

All pulpwood, pulp and paper reserves in every position are disappearing rapidly with no hope of replacement in sight.

What can be done about it?—That's a big question.

We welcome suggestions.

Newsprint Today and Tomorrow

▶▶▶ "IT IS AN ILL WIND that blows nobody good." The present paper shortage, acute as it is, may turn out to be a blessing in disguise.

Conservation and re-use are two words that do not typify the average American citizen. Rather the people of this country have become known as profligate wasters to peoples of other lands.

We have had so much of everything in this country that the tempo of thought has been to use wantonly and not to conserve or use over. It is true that there are exceptions to this, but in the main, it depicts a situation that has been all too common.

It was the growing scarcity of spruce, hemlock and balsam in the old established newsprint-producing regions of the United States that gave impetus to the development and growth of the newsprint industry of Canada. This scarcity was brought about in part at least by the careless cutting of our timber supply and often unwarranted waste of wood in the processing operations. The thought often seemed to be, "Why worry about the future. There is plenty of timber—so clean out and abandon." There was little activity at any rate in reforestation or in improving the rate of growth of forest lands.

All of the technological development of the newsprint industry, with little exception, has been confined to the production of newsprint paper from virgin stock. There, of course, has been some research on the de-inking and re-use of old newspapers in the production of newsprint. Also some years ago, a newsprint mill operated in the City of Chicago, making newsprint from wastepaper for the *Chicago Daily News*. This mill closed down after several years of operation, but it operated long enough to prove the practicability of the idea.

Only recently, the *New York Daily News* and the *Chicago Tribune* have made demonstration runs with paper using 10 per cent non-deinked wastepaper, paper with 20 per cent non-deinked paper, paper with 23 per cent deinked wastepaper, and paper containing 45 per cent deinked wastepaper.

Here again is demonstrated the feasibility of using wastepaper in the production of newsprint sheet.

Therefore, why not take advantage of a situation brought about by the War, and use this wastepaper now in so far as possible in alleviating the raw material supply problem in the production of newsprint; and then in the postwar era it might be practical to locate a number of newsprint mills in or adjacent to metropolitan centers to make newsprint paper from wastepaper. It is realized that such a development would alter the wastepaper situation of paperboard mills, possibly of some book mills. Yet, this very competition no doubt would lead to a more complete re-use of wastepaper in paper manufacturing—good economy if done within reason.

Chlorine Cylinders Needed

▶▶▶ MANUFACTURERS OF chlorine are appealing to all users of this chemical to return empty chlorine cylinders promptly. Apparently, these firms are in position to produce sufficient chlorine to meet essential needs; but are not in position to supply it if cylinders are not kept in circulation.

Since an empty cylinder can be set aside so easily and completely forgotten, please check the situation in your mill. If you locate even one lone cylinder, get it on the way to your supplier immediately. It will be one more act of co-operation in the winning of the war.

Current Thought . . . . WILLIAM SIBLEY

HOW TIMES HAVE CHANGED!

▶▶▶ TWENTY YEARS AGO THIS MONTH—December, 1923—when I walked into the offices of *The Paper Industry* and talked with the late Edward B. Fritz, I had small expectation of becoming this publication's perennial correspondent. But here I am—still blossoming forth with monthly prophecies which (for the most part) don't come true, or political preferences which (for the most part) don't get elected. Had I even so much as suspected, twenty years ago when I first introduced the idea of a "Current Thought" feature to Mr. Fritz, that I would be able to serve uninterruptedly each month for two decades; had I even imagined that I might become one of those unknown literary flowers which bloom by themselves and for themselves, I certainly would have thought the pulp and paper industry would far sooner than this have given me the Bronx cheer and yelled "Begonia" . . . But here I am, twenty years old as a feature of this magazine, now THE PAPER INDUSTRY AND PAPER WORLD, and in my editorial mathematics 20 times 12 is 240. Leaving aside the mathematics and speaking purely from the editorial standpoint, that means 240 headaches and cold sweats. I can only hope that it hasn't meant so much to the readers of this feature.

How times have changed! Twenty years ago Warren Gamaliel Harding had promised to return these almost United States of America "back to normalcy," and as I tried to point out at that time, people never go back to normalcy—they never go back anywhere except backwards. In spite of Mr. Harding's prophecy, we didn't go back to normalcy. We had a Teapot Dome and an oil scandal involving Japan which, without any doubt, contributed hugely to Pearl Harbor some 20 years later.

You may recall that Mr. Harding was nominated as presidential candidate in Chicago's Auditorium Hotel (so far as the public is concerned, at the convention held at the old Auditorium). Perhaps the most surprised man at the close of the nomination was Mr. Harding himself. As he phrased it: "I went into this game with a pair of eights and came out with a royal flush." Following that "pair of eights" (which I have always thought the excusable exaggeration of ego) we were followed by a taciturn gentleman from Massachusetts who, after 6½ years of administration, "did not choose to run."

How times have changed! Certainly the very good Coolidge phrase "I do not choose to run" is probably the most forgotten phrase in current political history.

While no one, including your "Current Thinker," would, of his own volition, sluff off twenty years and relive the past two decades, we have seen things transpire in that time which none of us years ago would have believed possible. For longer than "Current Thought" has lived, I have been in the advertising trade. For almost that long I have been identified with one of the more prominent industrial advertising agencies. Had anyone told me prior to Pearl Harbor that many publications (both large and small) would refuse space contracts, I would have been convinced that the man was a case for very serious study by America's most eminent psychiatrist. Advertising men have plenty of trouble trying to convince clients to spend their money. Whoever thought it possible that added to those troubles there might also be added the problem of trying to *spend* that money? Yet, that has come to pass. During the past two years I have worked every adjective known to Webster trying to get some perfectly good manufacturer (but neophyte merchandiser) to assign his hard-earned cash to the promotion of his business; only to find that after consummation of that contract the nearest I could come to getting desired space into one popular magazine was one-eighth of a page in another one. How times have changed!

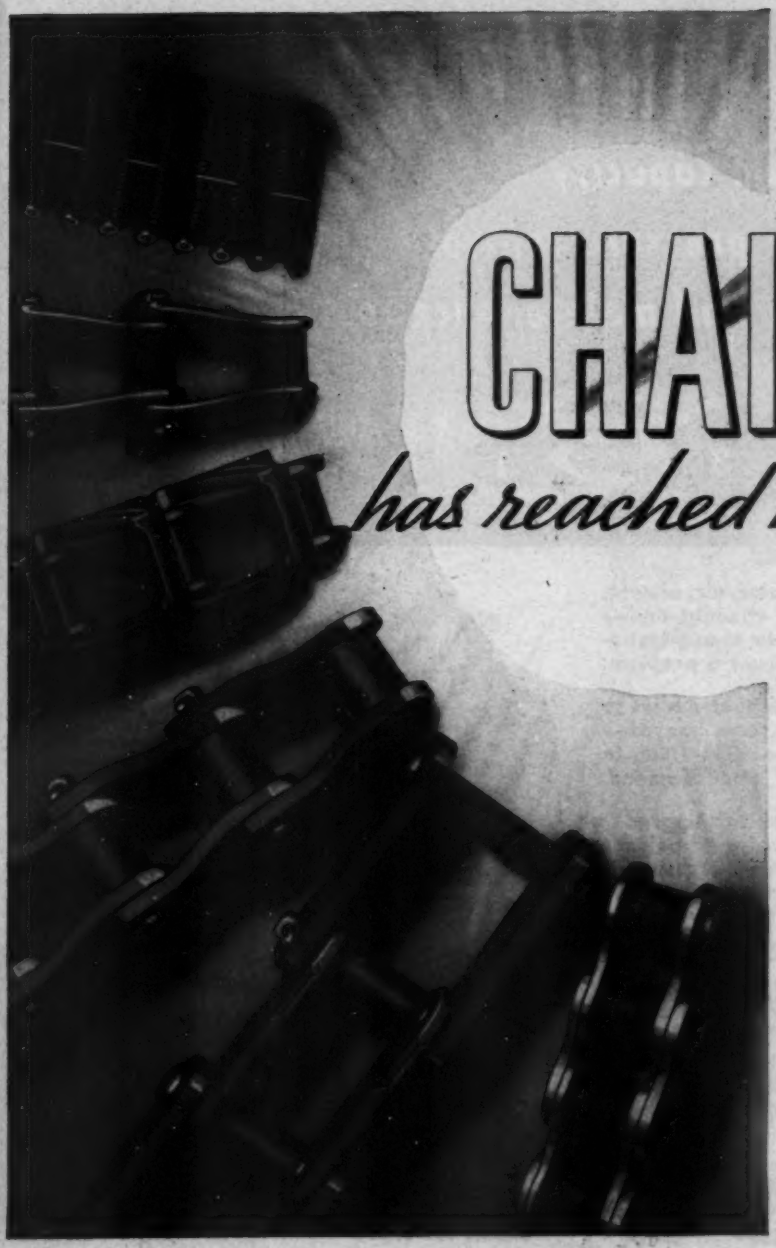
Who would have thought prior to the advent of that blind anniversary, December 7, 1941, ("blind" both in the political and military sense, because at the same time the Japanese airplanes were bombing our warships in Pearl Harbor, our administrators were talking gently about trade relations to Japanese emissaries in Washington) that paper would ever be a war essential! Surely a great many manufacturers who read THE PAPER INDUSTRY AND PAPER WORLD *knew* that to be true, but could they prove it? No. It took the noncomprehending (and incomprehensible) representatives of "the people" to delay recognition of paper as a war essential until literally thousands of American lads were needlessly killed. How times have changed!

If an inquiring reporter should question the average man on the street, the fashionably-dressed woman on Fifth Avenue, the average pedestrian on Michigan Boulevard, or the fisherman on Market Street, and ask them what would happen if by some unknown circumstance the Nation would be stripped of all of its paper supply within the next 15 minutes, what would they say? They would probably shrug their shoulders. What they do not know but *should* know is that without paper the insulation on electric cords would cause shorts in every factory in the Nation and that all industry would come to an abrupt stop. Then there would be no currency in the citizen's wallet; he could get no birth records; his stocks and bonds would be only memories; there would be no books or newspapers; peace treaties could not be signed; much of the clothing on his back and certainly his shoes would fall apart.

This country should have been sold on the importance of paper, and a good many years ago I advocated in this space the sponsoring of such a campaign—one to be paid for by the several associations or by the members of the industry on a tonnage basis. That national campaign, so needed ten years ago, so vital today, so futile ten years from now should have been undertaken by the industry long ago. The need has been realized, however, and a movement is now under way to organize such a campaign (See page 1006).

On this my 240th consecutive entry into the pages of this magazine, may I make a very earnest plea that the industry this magazine represents make it known, collectively and as a body, the importance of their product to the American people—whether it be in gun cotton for the destruction of the enemy or in diapers for protection of the infants.

In this particular regard, I hope far sooner than twenty years from now I can write another Current Thought on "how times have changed."



CHAIN *too,*

has reached new ceilings!

● Flying and fighting seven miles up, the modern war plane, capturing our fascinated wonder, is the symbol and the result of vast developments in every sphere of science and industry. In that plane, as in the plant that built it, and throughout industry today, power is produced, applied and controlled more efficiently because of continuing and accelerated engineering progress.

Chains used today for aircraft controls, for tanks, trucks, jeeps and other motive equipment, for conveying and mechanical power transmission throughout industry, have been vastly improved to meet today's exacting demands. Link-Belt engineers and metallurgists have perfected lighter, stronger, more precisely built chains of every type, answering, even anticipating, the needs of our production and fighting forces. Now, more than ever, Link-Belt is the recognized source for chain, and for the engineering service to aid in utilizing these newer, better chains to the great advantage of all industry.

Consult Link-Belt on any problem relating to mechanical power transmission, materials handling or conveying. You are assured of reliable, unbiased recommendations and of efficient, economical equipment.

LINK-BELT COMPANY

The Leading Manufacturer of Materials Handling and Power Transmission Machinery

Indianapolis 6, Chicago 9, Philadelphia 40, Atlanta, Dallas 1, Minneapolis 5, San Francisco 24, Toronto 8. Offices, warehouses and distributors in principal cities.

6178-A

Chicago Plants · Indianapolis Plant · Ordnance Plant

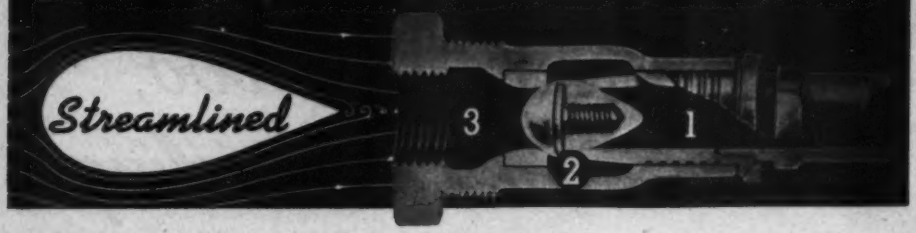
LINK-BELT

CHAINS AND SPROCKETS

for conveyors • for drives • for power transmission

STRAIGHT LINE FLOW

- *to insure maximum capacity*
- *for close delivery pressure control*
- *to save operating and maintenance cost*



1 **Straight Line Flow: Steam, water, air, oil, etc. flow through this valve in a straight line—nothing is in the path of flow to cause turbulence—therefore, peak flow is never a problem.**

2 **Inner valve is streamlined—no back eddies to hinder flow (see streamlined form above)—valuable when you want all possible fluid to go through the valve to meet peak demand.**

3 **Turbulence eliminated by venturi approach to the valve seat. This eliminates turbulence—it means better flow. The inlet pressure is confined to a small cylindrical chamber, the same being advantageous for high pressures.**

★ **The "1000" valve is single seated and its valve makes line contact with its seat ring which accounts for its tight closing characteristics. The unusually long diaphragm spring insures sensitive pressure control.**

CASH STANDARD Streamlined PRESSURE REDUCING VALVE TYPE 1000

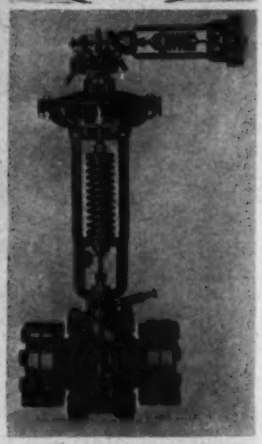
- Trouble-free service
- Smooth operation
- Tight closure
- Accurate regulation
- Elimination of failures
- Constant delivery pressure
- No spoilage
- Maintenance needs practically zero
- Speedier production results
- Cost-saving operation

Write for Bulletin 1000 to get details on this Streamlined Valve for smooth even flow of steam, water, air, oil, etc.

CASH STANDARD CONTROLS.. VALVES

A. W. CASH COMPANY
DECATUR, ILLINOIS

OTHER VALVES *from the* CASH STANDARD LINE



Cash Standard Type 30-AP Valve gives precise control of fluid pressures, through a pilot connected to the pressure under control. For steam, water, air, and most fluids.

Can be a pressure reducing valve or a back pressure valve depending on the way the control lines are connected. Pressures up to 600 lbs. Sizes ½" to 12" screwed; 1" to 12" flanged ends; wide variety of metals.

The Cash Standard Type 100 Controller above is operating an 8" Type 42-R Balanced Valve, automatically reducing 250 lbs. down to 125 lbs. pressure, handling 200,000 lbs. steam per hour

Type 100 Controllers have lots of operating power, enough for any size valve; are fully compensated; have adjustable range; are very sensitive. Bulletin 963 covering the Controller and Bulletin 965 covering the Valve give complete and interesting details. Write for them.

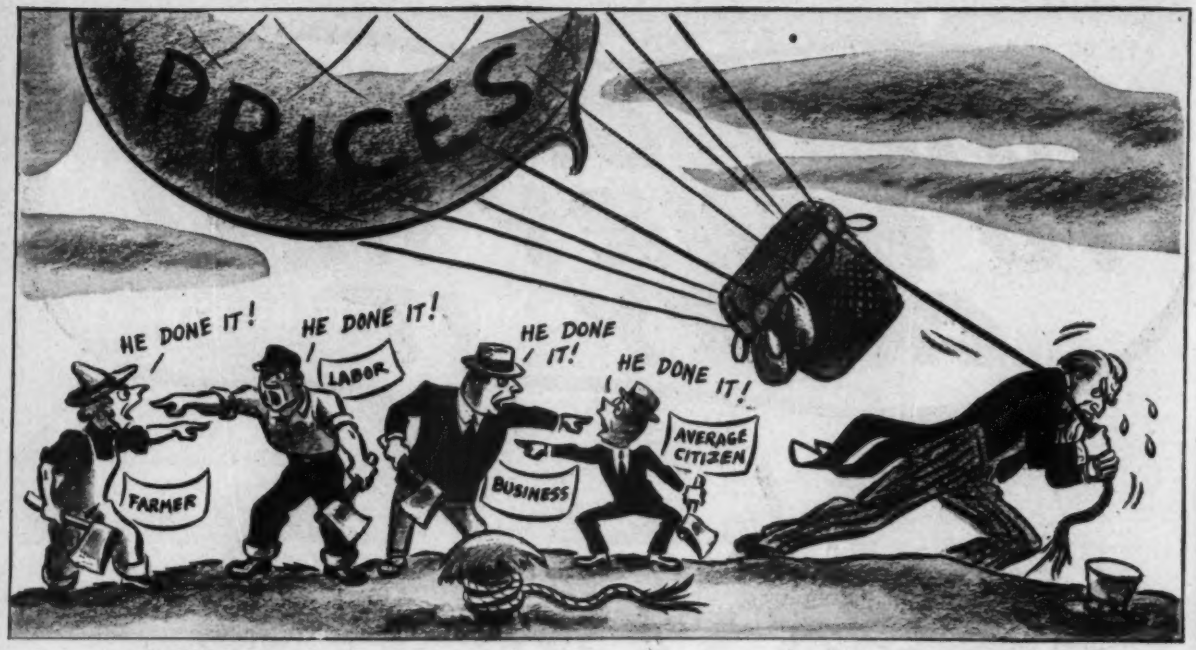
☆

THERE'S DEPENDABILITY IN APPLETON FELTS, TOO!

Paper Mills since 1890 have been depending on Appleton Felts, for they have learned by experience that Appleton Felts meet all requirements of mill production—year after year. Today's high speed production is met as easily as 1890's, because Appleton Felts have progressed with the rapid progress of the paper industry.

Appleton Woolen Mills

APPLETON • WISCONSIN



Never mind "who done it"—pitch in and help get it down!

THIS IS YOUR UNCLE SAM talking—but I'm going to talk to you like a DUTCH uncle, to keep all of us from going broke.

Ever since the Axis hauled off and hit us when we weren't looking, prices have been nudging upwards. Not rising awfully fast, but RISING.

Most folks, having an average share of common sense, know rising prices are BAD for them and BAD for the country. So there's been a lot of finger pointing and hollering for the OTHER FELLOW to do something—QUICK.

The government's been yelled at, too. "DOGGONNIT," folks have said, "WHY doesn't the government keep prices down?"

Well, the government's done a lot. That's what price ceilings and wage controls are for—to keep prices down. Rationing helps, too.

But let me tell you this—we're *never* going to keep prices down just by leaning on the government and yelling for the OTHER FELLOW to mend his ways.

We've ALL got to help—EVERY LAST ONE OF US.

Sit down for a minute and think things over. Why are most people making more money today? It's because of the SAME cussed war that's killing and maiming some of the finest young folks this country ever produced.

So if anyone uses his extra money to buy things he's in no particular need of . . . if he bids against his neighbor for stuff that's hard to get and pushes prices up . . . well, sir, he's a WAR PROFITEER. That's an ugly name—but there's just no other name for it.

Now, if I know Americans, we're not going to do that kind of thing, once we've got our FACTS straight.

All right, then. Here are the seven rules we've got to follow as GOSPEL from now until this war is over. Not some of them—ALL of them. Not some of us—ALL OF US, farmers, businessmen, laborers, white-collar workers!

Buy only what you need. A patch on your pants is a badge of honor these days.

Keep your OWN prices DOWN. Don't ask higher prices—for your own labor, your own services, or goods you sell. Resist all pressure to force YOUR prices up!

Never pay a penny more than the ceiling price for ANYTHING. Don't buy rationed goods without giving up the right amount of coupons.

Pay your taxes willingly, no matter how stiff they get. This war's got to be paid for and *taxes are the cheapest way to do it.*

Pay off your old debts. Don't make any new ones.

Start a savings account and make regular deposits. Buy and keep up life insurance.

Buy War Bonds and hold on to them. Buy them with dimes and dollars it HURTS like blazes to do without.

Start making these sacrifices now—keep them up for the duration—and this country of ours will be sitting pretty after the war . . . *and so will you.*

Uncle Sam

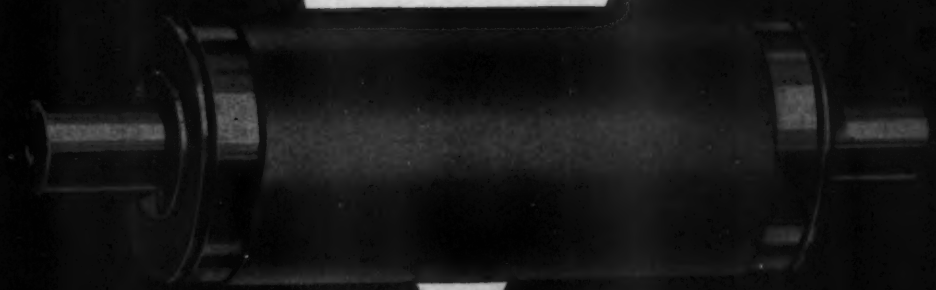
KEEP PRICES DOWN!

Use it up • Wear it out
Make it do • Or do without

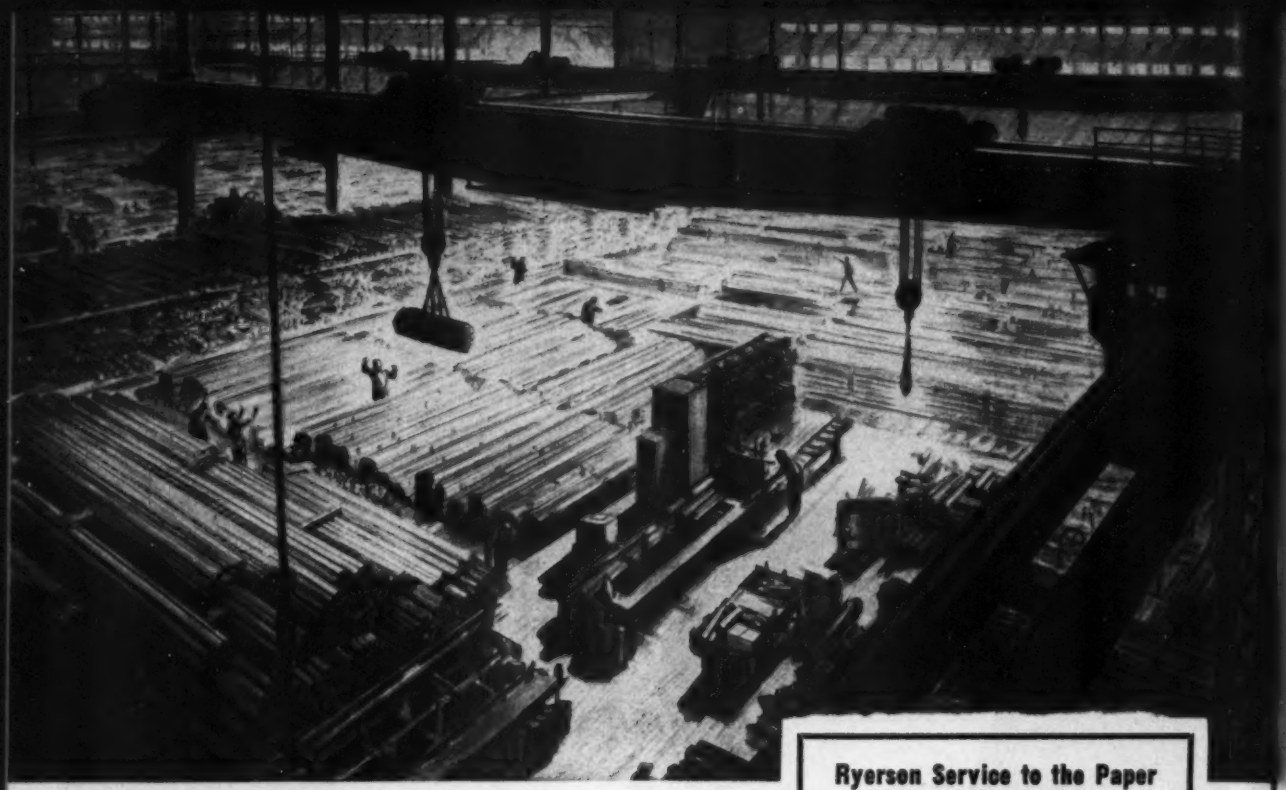
This advertisement, prepared by the War Advertising Council, is contributed by this magazine in co-operation with the Magazine Publishers of America.

★ ★ ★ PERKINS

There is No Substitute for Perkins Quality



B. F. PERKINS & SON, Inc.
HOLYOKE, MASS., U. S. A.
THE LARGEST MANUFACTURERS OF ROLLS IN THE WORLD



STEEL—for the Paper Industry

In stock for immediate shipment

Your nearby Ryerson Steel-Service plant specializes in the immediate shipment from stock of steel and allied products used by the paper industry. Ryerson men know the steels best suited to the hundred and one paper and pulp mill applications and can often give valuable assistance in solving special problems.

Whether you need steel for the day to day requirements of maintenance and repair, or to meet some emergency, a call to Ryerson will get prompt action. There is also a separate department for paper mill bearings.

If you have not yet received your copy of the current Ryerson stock list write for one today.

Ryerson Service to the Paper Industry Includes:

Stainless Steel, to resist the corrosive action of chemicals, etc.

Inland 4-Way Floor Plates: around beaters, grinders, and recovery plants; for bridges, runways, mill flooring.

Perforated Plates and Sheets: for screens, diffuser and blow pit bottoms, etc.

Pipe and Tubing: for rolls, stock, acid, alum, and liquor lines.

Forgings: for water wheel and grinder shafts, etc.

Corrosion Resistant Castings: for digester fittings, acid and relief line fittings, etc.

Steel Plates, of all kinds: for tanks, stock chests, vats, etc.

Tank Lugs: for blow pits, vomit stacks, stock chests, etc.

Tubes: for boilers, condensers, evaporators, heat exchangers, etc.

Steel Sheets, Bars, Shapes, etc., for steel and concrete construction and repair.

Tool and Alloy Steels, particularly adapted to specific purposes.

Chain, Wire Rope, Bolts, Rivets, Welding Rod, Chain Hoists, Machine Tools, etc.

Babbitt Metal: for motor bearings and general maintenance.

Ryertex Non-Metallic Water Lubricated Bearings, for barking drums, chippers, wet machines, deckers, beaters, jordans, paper machines, doctor blades, suction box covers, etc.

JOSEPH T. RYERSON & SON, INC.

Chicago · Milwaukee · St. Louis · Cincinnati · Detroit · Cleveland
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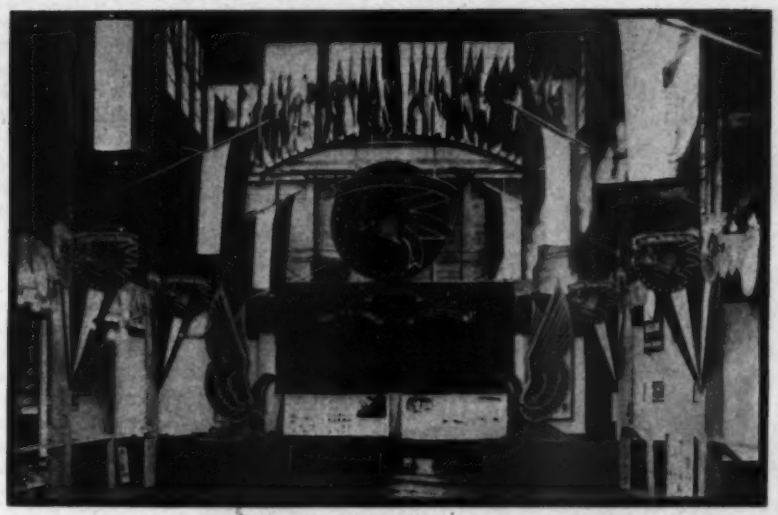
RYERSON STEEL-SERVICE



Employees honor roll surmounted by carnival emblem and flags of all nations.

Building Employee Morale

during this war period

CAL SKILLMAN
Supervisor of Employee Relations
The Champion Paper and Fibre Company

▸▸▸ THE CHAMPION FAMILY, men, women, and children, 10,000 strong. In normal times, a normal family; in war times, torn with the conflict and trouble of every kind. Ours is a typical family. Some of them like baseball; some of them enjoy going to the opera; some like to fish; and others enjoy a pleasure ride through the country in the family automobile. Due to wartime restrictions, transportation is not available, and these normal recreations are greatly curtailed. Extra working hours prohibit other forms of entertainment.

Until restricted by wartime regulations, the Hamilton, Ohio, Division of The Champion Paper and Fibre Company gave an annual picnic for its employees and families at a nearby summer resort. Special trains were provided, and the entertainment events such as contests, tournaments, swimming, boating, modern and square dancing, home talent singing, and professional acts were looked forward to by The Champion Family with a spirit of holiday anticipation. But, in 1943, this annual picnic was an impossibility.

Another annual Champion event was the Hobby Fair. At this fair quilts, sewing, woodworking, graphic arts exhibits, and hundreds of other hobbies were displayed. Again, wartime restrictions interfered because of a lack of leisure hours and the inability to obtain necessary materials.

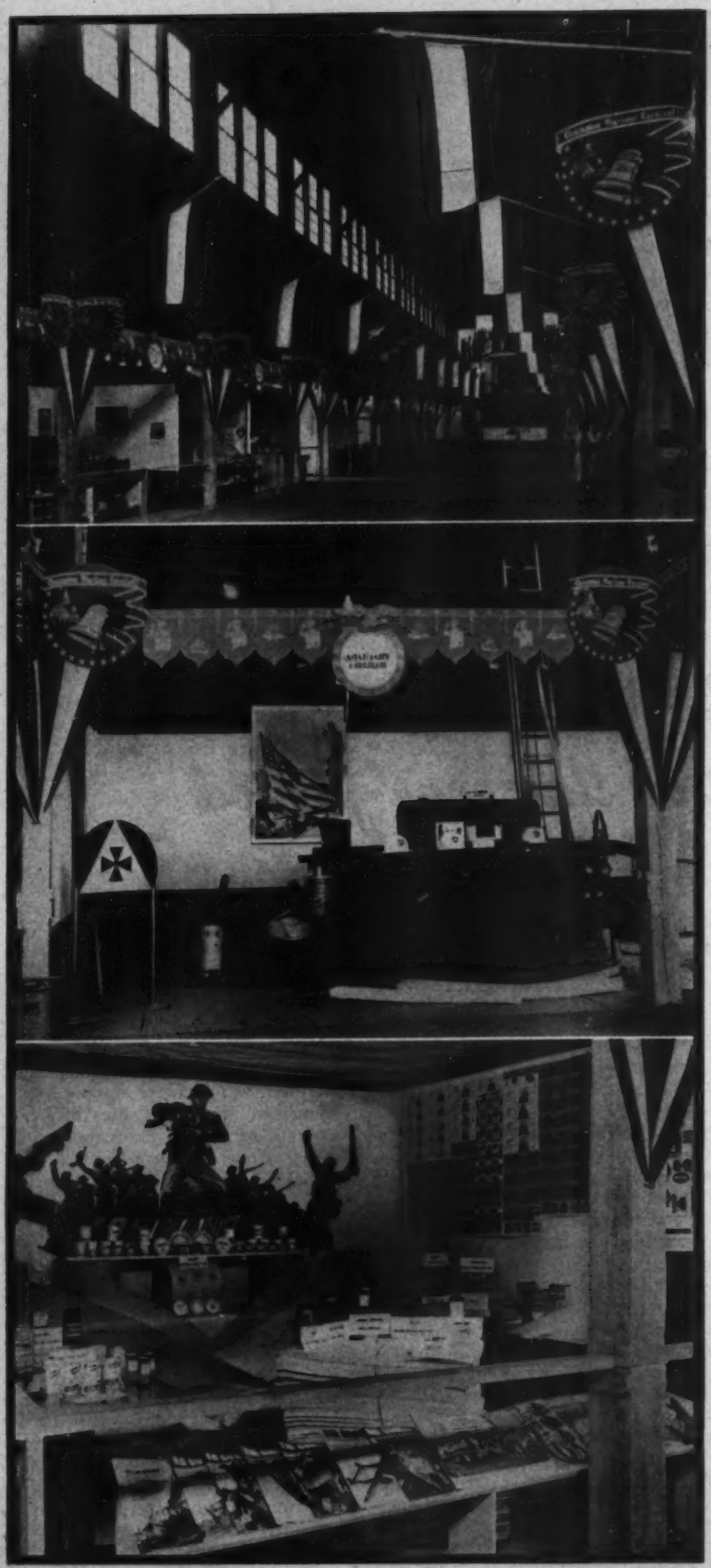
The Department of Employee Relations was confronted with the problem of how to replace these two popular events with one which was streamlined to war activity. A wartime substitute was needed, and as so often happens, the substitute proved equal to, if not better than the original.

Thus, out of necessity, was born The Champion Wartime Carnival, and this new child was such a success at its christening that in the future there will be an annual birthday party.

How the Wartime Carnival Was Organized

Our first activity after recognizing the need was to adopt an objective in which we stated our aims and purposes. The following was chosen: *To offer fellowship, entertainment, and guidance for Champions at home, in the community, at work, and in the Armed Forces.* It was decided that employees, their families, friends, and the general public were to be invited. No general admission was to be charged.

Champion has a committee of forty, known as the Employees' Committee, which is a representative group from all the departments throughout the plant. Since this group was originally organized for the promotion of wartime activities, such as war bond sales, scrap drives, etc., it was naturally its function to plan, supervise, organize, and carry out the activities of the Wartime Carnival. The Department of



Employee Relations assisted by drawing up the general objective of the Carnival and then gathering together a list of available places that it might be held, as well as other pertinent information.

The ideas and suggestions for the Carnival were then presented to the Executive or Planning Committee of the Employees' Committee. This committee accepted the challenge and started to work by setting up nine operating divisions. The chairman of each division, along with members of the Executive Division and representation of management chosen from the Personnel Department made up the General Carnival Executive Committee. These divisions were: Construction and Maintenance, Hobbies, Midway, Community at War, Home at War, Special Events, Champion in the War, Publicity, and Finance. Each divisional chairman chose his own sub-committee, who in turn chose members of his or her individual committee. It became the function of the Executive Committee to approve the appointments before they were made official. After the appointments of the committee chairmen had been accepted by the Executive Committee, each chairman was furnished with an outline of the functions and duties of his respective group. The completed outline consisted of over 200 men and women. Members were not necessarily employees, but in a number of cases were members of an employee's family.

ABOVE—General view of the main exhibit building . . . CENTER—Part of the OCD display showing auxiliary fire pumper and supplemental equipment . . . BELOW—End use of Champion paper.

Due to the fact that the Carnival was planned for employee participation and abetted by the condition of an extreme labor shortage, most of the work of the Carnival was carried on by committee members or other interested people from Champion. During the three weeks of preparation, many came to visit and look on, and they stayed to actually help in the work. No employee received any compensation or pay, other than those on the regular staff of the Department of Employee Relations who were assigned to work at the Carnival, and three members of the police force who acted as the necessary guards throughout the night.

The Butler County Fairground was chosen as the location for the Carnival. It is in the northeast section of Hamilton, within the city limits, and is adequately serviced by local buses. Champion contracted with the Fair Board to

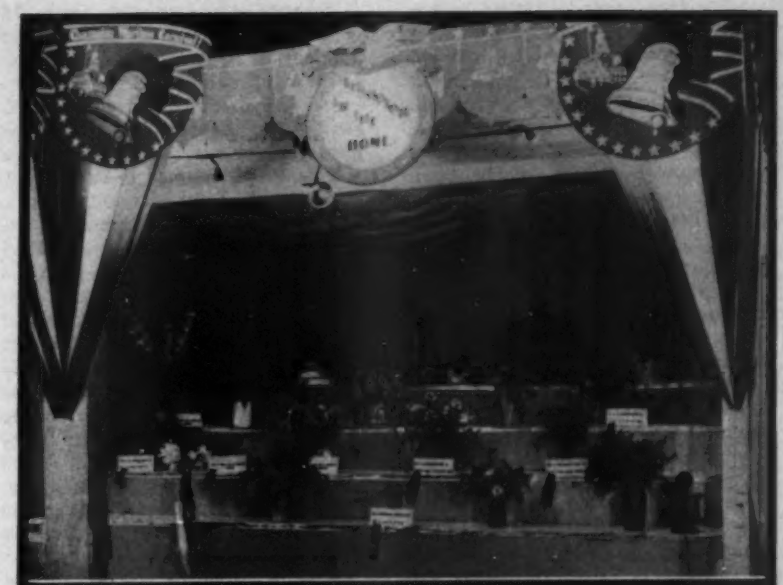
utilize all the grounds and facilities.

The theme of the Carnival was built upon community co-operation and alertness to the national and world crisis, and a symbolic emblem was adopted which consisted of a circular background in blue with a silver outline of Independence Hall and a bas-relief papier maché copy of the Liberty Bell. The emblem in various sizes was used throughout the Carnival Grounds along with extensive red, white and blue paper trimmings. The decoration scheme and sample installations were developed by the Department of Employee Relations and then carried out by volunteer help from the Champion Family.

In line with the patriotic theme of the entire show, various cutouts showing modern warfare and its equipment were used throughout all buildings. These were built by purchasing twenty-four-sheet posters of modern movie publicity, pasting them on a 3/16-inch thick wallboard, then cutting out with a tool known as a cut-all. They were mounted on appropriate places throughout the buildings and served as a background for independent displays in other places. It was found that illustrations of any type of military equipment desired could be located by requesting a poster catalogue from a local movie house and selecting posters from current movies.

Although the Carnival was staged as a morale builder for essential wartime workers, it was necessary that all arrangements be made without taking advantage of any priority rights in purchases, and it became difficult to locate the proper material in adequate amounts. Scrap supplies and materials were located in various places throughout the mill and from the homes of individuals. Local lumber yards, hardware stores, and paint stores co-operated splendidly by making available such materials of which they had only a limited supply. The drive to locate needed supplies and materials, could, in itself, be a long story, but it can best be told by relating three instances:

1) No one place could furnish the necessary number of 100-, 200-, and 300-watt incandescent lamps which were necessary, but the City of Hamilton, the Champion Company, and one local merchant together could loan us a supply if we promised to return them. In using light bulbs, the general experience has been that a large number of them are broken or misplaced. However, all persons who



ABOVE—Flower Show . . . CENTER—Victory garden produce . . . BELOW—Gas defense instructions.

handled them were cautioned to use special care, and instructions were given to have them removed immediately after the Carnival. The result was we returned all but 6 of the 800 lamps used—a loss of less than one per cent. Complimentary mention for this was given us by the City of Hamilton.

2) In staging any affair of this kind, a great number of electrical appliances are used: motors for turn tables, table lamps, spot lights, flood lights, and electrically-operated exhibit material. One of our greatest difficulties came in finding extension cords that could be used with the various electrical appliances. By the co-operation of all members of the committee and their assistance in bringing extension cords from home, we were able to make proper connections with all desired places. The cords were all marked so that redistribution after the Carnival would be easy.

3) A great need for lumber and wall board was met by substituting used wet felt and dryer felts in the construction of partitions, etc.

For many months, hundreds of Champion employees had studied and worked at Civilian Defense for Hamilton and its surrounding villages. Countless others had answered the call of the Red Cross for participation in its world-wide service. Another group had worked throughout the entire summer and fall in Victory gardens and prepared the produce of these gardens for winter consumption. It was only fair that these groups be given an opportunity to show their neighbors, friends, and the citizens of the community the result of their months of work. The main exhibit hall of the Fair Ground was set aside for this purpose. Proud members of the Civilian Defense group worked long hours to prepare for exhibiting their accomplishments. Barren display booths began to be crowded with a collection of auxiliary fire pumpers, gas masks, gas protection clothing, auxiliary radio equipment, and all of the other tools of their leisure time avocations.

Another group worked long hours in preparing and setting up for operation a typical USO canteen. This group adopted as its motto: "Send a Carnival post card to your friend in the service." A sub-post office was ready to receive this mail, and the correct mailing addresses of all employees in the service were available for those who requested them.

One group had been working in advance collecting samples showing the final use of Champion paper and how it ultimately fits into the war needs. Samples of hundreds of finished paper articles were arranged for display to Carnival visitors. Champion "old-timers" or employees with 25 years of service were as active as the young folks in preparing their booth which was to serve as a reception center for registration and reminiscence. Pictures and letters put away for years were brought out. A display service of pins, rings, and medals was proudly pushed to the front.

In another booth, members of the Champion Safety Committee worked untiringly to complete a "peep show." This display was to be known as "Saboteurs even the F. B. I. can't catch." Later, when the show was in operation, visitors suspiciously bowed their heads to one of the peep holes and watched a typical family performing many of the ordinary household jobs in the unsafe way. Worn and frayed ironing cords, broken step ladders, unguarded mechanical equipment, and all the other dangers were vividly dramatized.

Another group of enthusiastic outdoor gardeners started late, then worked frantically preparing their garden displays—the nature of these displays, of course, was such that the work could not be done very much ahead of time. This display had to be re-arranged and new material brought in each morning. All the flowers raised in the vicinity at that season of the year were displayed in the flower show.

Vegetable gardeners as a group proudly displayed the results of their year's work. Their wives also displayed processed and canned fruits and vegetables. A typical home living room was set up by a group of busy housewives with ideas displayed for home recreation. They made available for the use of visitors a piano and other musical instruments, radio, and victrola, checkers, chess, cards, dart games, and dozens of other things for leisure time recreation.

As had been partially expected, the displays that came in through the Hobby Division this year were more in the nature of a collection rather than actual, active hobbies. Spare time activities are not getting the play they did in normal times; therefore, people are using money to buy collections rather than using time for the purpose of making hobbies.

Immediately adjacent to the main exhibit building was an open shelter house large enough to accommodate several hundred people for continuous movies which went on throughout the entire five days of the Carnival. These movies were both educational and entertaining and were presented free to the public. Another building used normally as a little theatre was converted into a dance hall. Volunteer employees spent hours sanding, sealing, and waxing the floor so that it would be suitable for dancing. Stands and racks for games and concessions were built throughout the grounds—all to be operated by volunteer help, with all profits going to local and national charities. A Champion Girl Hikers' Club took over the maintenance and operation of the food and drinks concession. The various committees in the Midway Division set up and later operated a fish pond, pony track, pitch games, dart games, and all the other Midway attractions usually found in a carnival.

Another group enthusiastically operated until late each night the ever-popular Bingo game. All games and concessions were operated at a playing cost of one to five cents. Special events were staged by the Committee for that purpose with such activities as a pet parade, horseshoe tournament, and a performance of the Navy Glee Club from the nearby Navy Radio School at Miami University.

In line with Champion events of this nature, the Carnival was scheduled to operate during the last part of one week and continue over into the first part of the next week. This is done with the intent of allowing shift workers to attend. Change of shifts over the week end means that everybody can see or participate in the activity. The first Champion Wartime Carnival operated five days from Friday through Tuesday. Doors were open at seven o'clock and closed at midnight. On Saturday and Sunday everything was opened at two o'clock in the afternoon.

Despite five days of nearly continuous rain, over 15,000 people participated in or enjoyed the Carnival, and a net profit of over $1,400 was turned over to charity.

One of the commandments that we have developed for the operation of our Employee Relations is: "Present a spectacular program in concept, but intimate in application." We believe the first Champion Wartime Carnival fulfills that commandment. In fact, we believe that it fulfills all six of our Employee Relations Commandments which are as follows:

1) Program based on careful study of the facts and emotions which effect the employees' point of view.

2) Hitch our program to a vehicle that serves the interest of all.

3) A spectacular program in concept, but intimate in application.

4) Place emphasis on how good we hope to be, not how good we have been.

5) Include all media, but basically education.

6) Use not one shot by a big shot, but a continuous application of little considerations by many.

Fourdrinier Press Felts

ARCHIE McCAFFERY

▸▸▸ THE FELTS OF A fourdrinier machine have a two-fold function: (1) to serve as a filter for the wet sheet of paper during the time interval when a portion of its water content is being pressed from it, and (2) to act as a carrier or conveyor for the sheet in its travel from the couch to and through each successive press of a machine.

These felts are not true felts; rather they are woven woolen fabrics which vary considerably in design and in weight, depending upon the service. The use of the term "felt" for this item of paper machine clothing probably dates back to the early days of European papermaking, when no doubt a matted felt of wool or hair was used to couch paper from hand moulds. This true felt was superseded by woolen cloth, pieces of which were simply sewed together to make the felts of early fourdrinier machines.

Woven crosswise of each felt are two or three colored stripes or bands. Designated as seams, these stripes identify the manufacturer of a given felt. They also serve as guide lines for the machine tender in keeping a felt running straight.

Putting on a First Press Felt

In changing a first felt, in other words, putting a new felt on the first press, the machine tender unless completely familiar with the machine, should observe what felt rolls are inside of the felt on the machine before cutting it off. This procedure expedites felt roll assembly after the new felt has been positioned. One of the most important things to observe is which carrier roll should go in last.

On most machines, the operation of getting a new felt over a bottom press roll is about the same. The top press roll is lifted and secured. Then the bottom roll is pulled up.

On some machines, the save-all does not have to be disturbed; on others, it has to be taken out. Seldom do any of the carrier rolls have to be put inside the new felt before bringing it over the end of the bottom press roll. Yet in some cases this practice is necessary.

With the machine in readiness to take the new felt, the felt is removed from its wrapper; then it is unfolded or stretched out on the floor.

Upon unfolding the felt, if the nap is found to lie in the wrong direction for operation on the machine, the felt must be turned over completely or turned around end for end. Likewise, if the nap on the outside of the felt is longer than on the inside, the felt must be turned inside out before putting on.

If the machine is equipped with a suction press rather than a standard press, it is not necessary to have the longer nap on the inside of the felt. Likewise, with such a press, it isn't necessary to remove the box around the front journal or to disturb the save-all.

Instead of taking out the box, the bolts in the supporting stand are taken out and the section removed. The vacuum pump servicing the roll must be stopped before putting on a felt. Otherwise, the felt will be ruined in passing it through the open section in the frame. The save-all on such a press part is attached to the box of the press by a bracket, making it unnecessary to remove it.

The help of the entire machine crew is required to put on a wide felt most readily. All crew members except the backtender and machine tender should be stationed conveniently to carry the middle portion of the felt to the side of the machine. The back tender should take the felt over the frame of the press and into the pit behind the press. The machine tender follows with his end but holds out enough slack to get the bottom reef of the felt under the journal of the press roll. If the seam is kept high and in front of the machine tender, the felt cannot be put on wrong.

If the save-all has been left in, it should be tied up. Then, with the machine tender hanging onto the seam, some other member of the crew should slip the bottom reef of the felt down through the space between the press frame and the save-all.

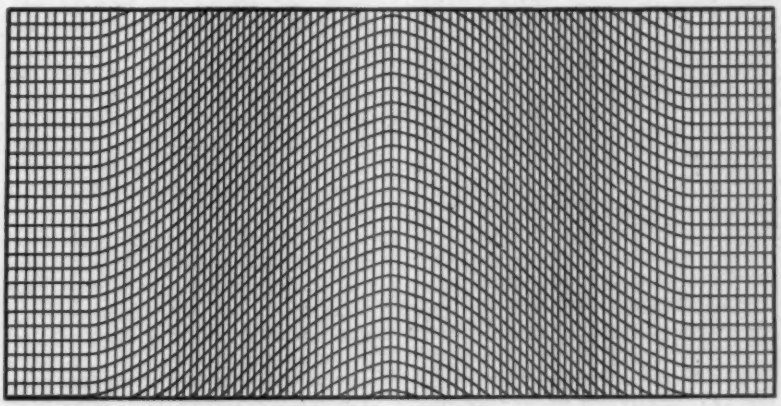
After this operation, the save-all should be let down, the bottom box of the press roll journal put in place, the press roll lowered into position, and the attachment used to hold it up removed.

The reef of the felt held by the machine tender next should be slipped in between the press rolls and then the carrier rolls put in.

The roll immediately ahead of the press, or the suction box if used in place of a roll in that position, should be the first item to be placed back into position inside the felt. The rolls adjacent to the fourdrinier and the shower pipe are next in order for inserting.

After these machine parts have been put back in position, one, two or three rolls behind the press, whatever the machine calls for, are then put into position inside the felt. The last roll sometimes requires considerable effort to get back where it belongs.

After these rolls are positioned, the felt is on. If the machine is equipped with a top press roll, it then is lowered into position.



Drawing showing distortion of felt weave when seam is crooked. (Courtesy F. C. Huyck & Sons.)

Putting on a Reverse Felt

In putting on a reverse felt, whether on a second or third press, a felt that is heavier, thicker and less porous than that of the first press, the levers of the press are taken off, the press rolls raised and the box beneath the journal of the bottom roll on the front side taken out. Likewise, on some machines, the save-all is taken out.

As in the case of the first press felt, before removing the old felt, it is well to observe what rolls are on the inside of the felt so that they can be positioned in the same way when the new felt is placed. Then, too, the roll to go in last should be ascertained.

The nap of the felt on a reverse press must lay in the direction that it is hauled between the press rolls. Therefore, upon removing the felt from its package and unfolding and straightening it out on the floor, precaution must be taken to see that the nap lies the right way before putting the felt on the press.

In preparation to putting the felt on the press, the machine tender and backtender together draw the felt into a rope with seams showing on the top reef. Then, with the felt being supported in the middle by other members of the crew, the backtender leads it in between the reverse press and the next unit in succession, the machine tender in the meantime, holding the felt back and keeping a seam high.

Sometimes the felt must go over a carrier roll before being put around the journal of the bottom press. Where this procedure is not necessary, the crew, pulling from the outside, drags the felt into the space between the front bottom press roll journal and the inside of the frame where the save-all box was located, a quantity of slack being pulled through and hung up on the front end of the top journal.

The save-all, if out, is put back into position as the next operation of the felt changing procedure; and then the bottom reef of the felt is fed in between the save-all and the frame. With the felt in this position, the front journal box of the bottom press roll is put back into position, the press roll lowered into position, and the strap which had been supporting it removed.

The felt next is pulled in between the two press rolls and then the carrier rolls ahead of the press are put in place. When these rolls are positioned, the felt is pulled up on the back side of the press, getting slack from the bottom, and the remaining carrier rolls installed.

In changing a felt, little trouble will be experienced if precaution is taken to be sure that the nap of the new felt is laying the right way and to observe which of the felt rolls should go in last. All frames are not the same, but certain rolls on each frame go inside the felt and one of the rolls goes in last. In some instances, it is possible to gain slack by putting the felt over a roll and leaving the roll out of its boxes until the felt is on.

Starting a New Felt

The procedure to be followed in starting a new felt depends upon the kind of press upon which it has been installed. If it is an old type press and the felt has been put on with the longer nap on the inside, all that has to be done in starting the felt is to let down the top roll, put on the water and to rope the felt into the middle of the machine, letting it run in this way until completely saturated with water. After the felt has become saturated, it is pulled out and tightened.

If the new felt is installed on a suction press with a brass shell, it will be necessary to straighten out and to tighten the felt by hand before lowering the top roll. In this case, there can be no wrinkles. Another felt will have to be put on if there are.

A new felt installed on a suction press with a rubber covering can be started in the same manner as a felt on an old style press. In this case, however, it is not necessary to have the longer nap on the inside of the felt.

In putting a suction press into operation, care should be taken to start the pump before leading over the paper.

Any felt that is put on with the nap lying the wrong way will wrinkle. This wrinkling will last for two or three hours. In addition, if it happens to be a first felt, feltmarks will show in the sheet during the life of the felt.

To keep press felts clean and otherwise in good operating condition, several designs of felt conditioners have been developed. One popular design is a unit that utilizes a water jet and a miniature suction box. Applied commonly to the face of the first press felt, this conditioner forces water from the face to the back of the felt and then returns it to the face through the application of partial vacuum by the suction box which receives the water and from which it is discharged away from the machine.

The conditioning unit, which houses both the nozzle and the suction chamber, works on only a narrow strip of felt at a time. Either one or two boxes are used for a felt. If one box is used, it travels slowly and continuously across the entire working width of the felt. If two boxes are used, each box likewise traveling slowly and continuously conditions the opposite halves of the felt.

With this conditioner, it isn't necessary to keep it in operation at all times. Conditions dictate the practice to follow.

Felt Blowing

Sometimes air gets between the sheet and the felt, and accumulates under the paper in front of the top press roll. This condition, known as blowing, wrinkles the sheet.

A felt nap which stands up causes this trouble. The raised nap holds the paper up and prevents the suction box from performing its full duty. It is because of this trouble that a new felt installed on an old type press is put on with the shorter nap on the outside. The shorter nap permits less air to get between the sheet and the felt, thereby minimizing the tendency of the sheet to blow.

The more a felt is tightened, the more the nap stands, and the greater is the quantity of air that gets in between the felt and the sheet. The slacker a felt is run within reason, the easier it is to make the nap lay. Likewise, the drawing of the paper between the felt and the wire as tightly as possible will lay the nap and shut out the air.

Keeping a felt seam straight is of help in preventing blowing, as is high vacuum in the suction box.

The quickest way to get rid of blowing is to purposely crush the paper on the first press, letting it run that way for a little while. Two to three minutes should be sufficient if the machine is running 500 fpm. Then the felt may be tightened and the nap will lay so that the suction box can do its work, thus ending the blowing.

A new felt unless treated with a suitable wetting agent will not remove water as readily for the first few hours of operation as an older one. Where a wetting agent is not available for this purpose, if production is wanted, all that can be done is to increase the steam pressure in the dryers.

Straightening Out a Felt

Often when felt carrying rolls are worn in the middle, seams will run ahead on both sides and behind in the middle. Under normal conditions, the opposite is true; that is, the seams or middle of a felt will run ahead of the sides because of the carrier rolls springing in the middle thus shortening the distance the center of a felt must travel as contrasted with the sides.

A tight felt invariably will run ahead in the middle unless there is some abnormal condition to change it. Contrariwise, a suction box on a first felt will cause the felt to run behind in the middle. It is bad enough to have seams running ahead in the middle; but it is worse when they run behind there.

If there is no suction box on a felt that is running behind in the middle, the probability is that some of the car-

rier rolls, perhaps all of them, are out of caliper. In such event, a checkup of the felt rolls should be made to find the source of the trouble and to correct it by replacing the old rolls with the necessary number of new ones.

The wearing away of felt rolls in the middle after long use is caused by the roping of felts, time and time again, in the process of washing. Sometimes a roll that is full in the middle is run to correct this fault. It is not good procedure since a felt will not perform as satisfactorily as when all rolls are of the same caliper.

Sometimes new felts are straightened out without previous roping and then soaked with water. If this practice is followed in conditioning a new felt, care must be taken to not get too much water in one spot. Several hundred pounds of water resting in the middle of a felt might stretch the felt unevenly and to such an extent that it would be impossible later to take out the wrinkles. Even with a full shower, water may accumulate in the middle, and, if so, part of the water must be shut off to prevent the ruining of a felt.

Each press section is provided with a felt tensioning arrangement consisting of a stretch roll, stretch shaft, and two jacks—one jack on the front side, the other on the back. If a felt is tight, and the back side is slackened it will become shorter on that side, or, if tightened, it will become longer.

Usually a machine tender watches the felt seams to see whether they are running ahead or behind on the back side. If so, adjustment of the back side jack is made to straighten it.

Once a felt is tightened, neither side is ever slackened unless necessary. If for some reason, the back side of the felt has to be slackened, say one turn, somewhat later both sides should be tightened one turn. In making this adjustment, the distance in the back side of the stretch has not changed; rather the front side is one turn tighter.

If the seam in a felt is running straight and the felt is tightened enough to spring the carrier rolls, the seam will run ahead in the center. If a shell in a felt roll box wears out, the seam on that side of the felt will run ahead. If stock gathers on the felt rolls, either inside or outside the felt, it will change the angle of the seam unless the rolls are uniformly covered from end to end. The harder pull of a suction box in the middle of a felt than on the sides causes the seams to run behind in the middle.

Trimming a Felt

When trimming a felt, the cut in the edge should be made lengthwise of the felt. If the cut is made on the diagonal, the knife should be canted toward the machine rather than away from it. By following this practice, the trimmed edge will be clean. If the incision is made in the felt with the knife canted out, it will leave a small projection on the edge of the felt.

It is not uncommon for a felt to tear when a machine tender is trimming it. If trimming is done properly, a felt will not tear in the process unless it is very slack. A machine tender, therefore, should make certain that the felt is fairly tight before starting the trimming operation.

Felts often are trimmed when running even though it is risky at any

Kv-a.—Kw.—Hp. Calculator

V. W. PALEN, Editorial Service
Westinghouse Electric and Manufacturing Company

▶▶▶ PLANT ENGINEERS and electricians will find the Kv-a.—Kw.—Hp. Calculator a very useful gadget to have on hand—it saves much time in making routine calculations involving electrical capacities. It solves single- and three-phase problems expressed by the accompanying formulae:

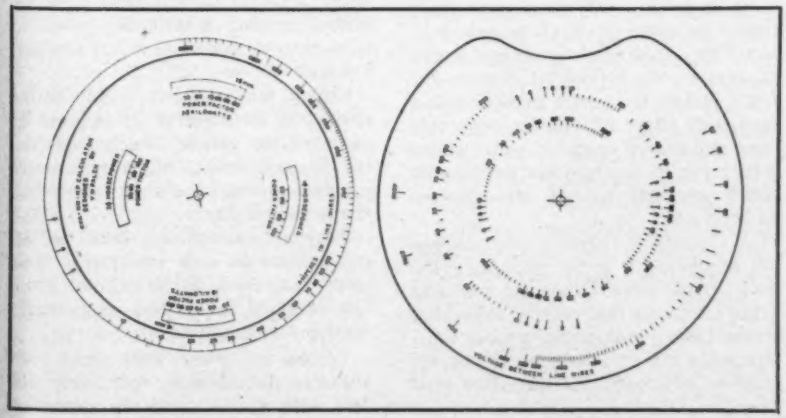
(a) Single phase

$$\text{Kv-a.} = \frac{\text{Volts} \times \text{Amps}}{1000} \qquad \text{Kw.} = \frac{\text{Volts} \times \text{Amps} \times \text{P.F.}}{1000} \qquad \text{Hp.} = \frac{\text{Volts} \times \text{Amps} \times \text{P.F.}}{746}$$

(b) Three phase

$$\text{Kv-a.} = \frac{\sqrt{3}\,\text{Volts} \times \text{Amps}}{1000} \qquad \text{Kw.} = \frac{\sqrt{3}\,\text{Volts} \times \text{Amps} \times \text{P.F.}}{1000} \qquad \text{Hp.} = \frac{\sqrt{3}\,\text{Volts} \times \text{Amps} \times \text{P.F.}}{746}$$

The range of the calculator 5 to 200 (Kv-a.—Kw. or Hp., as the case may be) can be extended easily to cover a range of 50 to 2000 merely by multiplying all values by 10. It can be used to find Kv-a., Kw. or Hp. from known values of amps and volts; similarly it will determine amps for given values of voltage, Kv-a., Kw. and Hp. Thus, knowing the size motor to be installed, an electrician can quickly determine amps—from this he knows what size wire to use for the circuit. Conversely, having read amps at transformer terminals—the calculator tells what load, in Kv-a., the transformer is carrying.



To assemble, cut out both discs (also small windows) and mount on cardboard with rubber cement. Punch the center holes carefully—then insert a small brass bolt in the holes. Washers, if used will save wear and tear on the paper. The bolt should be tightened to give the proper pressure on the discs—they must hold their setting, yet turn easily. A drop of solder applied to the nut will make the assembly permanent.

time to do so. To trim a felt in this manner, the machine tender usually holds a knife blade against the felt at a point where it contacts some roll long enough to slit the felt for a distance of about two feet. When the slit comes around again, the felt is grasped by the machine tender who breaks the strip and pulls on the free end until the full length of felt has been torn. One danger in this practice is that the warp of a felt is not always straight. If such a felt is trimmed when running, the tear is apt to go deeper and deeper into the felt, thus spoiling it.

Most felts have to be trimmed after they have run one day, and again on the third day of operation.

Some felts, made with slack edges, must be drawn up so tightly that they are lengthened and narrowed in so doing. Likewise, such tension springs the felt folls, which, in turn, cause the seams to run crooked.

The crowning of a bottom press roll sometimes is blamed for felt seams running ahead in the middle, but it is doubtful if any normally crowned roll causes such a condition.

Guiding Wet Felt

Any wet felt will skid immediately to the front side upon tightening of the stretch roll on the back side. The skid to the front side, however, will be only long enough for the seam to change. If the tightening has been sufficient to put the seam behind on the back side, the felt will run off later on the back side.

Every felt with a seam behind on its back side will skid to the back side. If the seam is behind on the front side, the felt will run off on the front side unless checked by a felt guide.

If a felt runs off on the side on which the seam is ahead, unless the machine tender has done something to cause it, some roll is out of place, or possibly a guide has broken or the felt has run over the guide.

Usually automatic guides are provided for the wet felts. One type of guide consists of a loose block or cone that fits over the outside journal of a carrier roll and connects with a swing roll through a strap and cable. The felt is guided to contact the strap by means of a hand guide. The friction so induced causes the block or cone to turn, and upon so doing winds or pulls on the cable attached to the swing roll, thus throwing it out of distance and guiding the felt.

Often regular wire guides are used to keep felts on a machine. A felt in such a case does not have to be guided toward the front side with a hand guide. Rather the pan fixture of the guide leans on the edge of the felt and follows it in its recession. If the edge of this felt advances and brings pressure against the pan fixture, the pan is moved, thus causing a fork or dog to catch in a controller wheel which brings about felt adjustment.

Automatic guides may be set in or out, depending upon felt widths; while strap guides, when functioning upon narrower felts than for which they were installed, require wider straps.

Sometimes a new felt, and often a felt following a wash-up, will run with a seam behind on one side. In such cases, unless a roll has jarred out of distance, the felt will run off the machine on the side on which the seam in the felt is behind. To get such a felt back on the machine, it is necessary to slacken up the felt and to pull it back on the machine by hand, or else to tighten the stretch on the side of the felt on which the seam is already behind. If the felt starts wrinkling, the only thing that can be done is to slacken it and to pull it out by hand.

If the seam is behind on the back side, the machine tender must be on the alert to slacken the stretch on that side as soon as the felt starts to come to the front. The press should be stopped immediately and the weights, previously removed from the press lever on the front side of the section, put back in place. Also the felt guide should be put back on center. If these things are not done, the felt will run to the extreme in the other direction.

Hesitation in stopping a wet felt, a dryer felt, or a wire, has resulted in much ruined paper-machine clothing.

Washing Felt on Machine

In washing a felt on a paper machine, the usual order of procedure is as follows: take off weights and levers of press; turn on water showers on felt; slacken felt; start press section; turn both edges of felt in; rope felt into middle of machine; and allow felt to run in this position until water being squeezed out of felt appears to be clear.

A number of chemical preparations are available for use in washing felts. Such preparations loosen up size and other chemicals that may be imbedded in the fabric. Sometimes a weak solution soda ash or a solution of viturol may be employed for the same purpose.

If a chemical solution is used in addition to the water washing of a felt, the solution is used first and then is followed by a thorough washing with water.

Years ago, when a felt was to be washed, it was common practice to take it off the machine to do the job. Roping on the machine, however, was found to be superior and is now commonly used whenever a felt is washed.

A machine tender sometimes erroneously thinks that he is saving money for his employer by running dirty felts. The cost of removing water at the presses is so much cheaper than on the dryers, that it always is good practice to keep felts clean so that they can best do their work.

Suction rolls and felt conditioners make it possible for felts to be run on some grades of paper without being roped up and washed. However, even with this equipment, felts on other grades must be washed.

Felts usually are turned over when they are washed—that is, they are turned inside out. The result of this turning is twofold: the paper runs better, and felt wear is more evenly divided.

Dirty felts also influence the life and behavior of dryer felts. If insufficient water is removed from the sheet at the presses, dryer felts become saturated. Such felts rot more quickly than felts with less water in them. They also run into a wrinkle more easily; and, if they do, there is the danger of spoilage.

Another way in which dirty felts affect the drying of paper is in the higher drying temperatures required. If the paper being made is heavily sized, the excessive heat of drying reduces size penetration, sometimes so badly that it is not uncommon under circumstances of this kind to observe a penetration drop after each successive reel until the felts are washed.

When felts are badly filled, the piling on of additional weights upon the press levers will not take out more water. Rather, if the press rolls are rubber covered, it will cause them to corrugate, necessitating a roll regrinding job.

Often felts are run with seams slanted at an angle of 45 degrees or more off the parallel. Such felts cannot do good work. Much more water is removed from the sheet where felt seams are straight.

First felts often are held by the suction box in such a way that their seams run behind in the middle. Properly designed suction box covers would remedy this condition.

Second or press felts often run ahead in the middle. Sufficiently stiff felt rolls would cause the seams on these felts to run straight.

Often it is hard to determine whether a suction box operating on a first felt is removing much water. An indication of the quantity of water being removed by the box can be observed by closing the suction line to

the box and witnessing in so doing the additional water that is discharged from the save-all of the press.

If felts are persistently pulled apart with tightening jacks, all that the felt manufacturers can do is to make stronger and tougher felts at the sacrifice of filtering ability.

What Shortens Felt Life

There are a number of causes for short felt life. Wear incident to water removal, corrugated rolls, tight felts are among them; but the greatest single factor is the inability to run felts slack because of the equipment.

Where there are no suction press rolls or felt conditioners, felts must be run tight to prevent sheet crushing in the presses. Likewise, when felts are tightened unduly, the carrier rolls spring, and sprung rolls cause felts to close up, and fill more readily. Conditions of this kind bring about short felt life.

A badly filled reverse press felt will run when dirty; but as a result of such a felt, the sheet requires more steam for drying. Likewise, if such a felt is run long enough, it will become filled with holes and will be spoiled.

The ideal arrangement would be to operate with smoother and stiffer carrier rolls and with the journals of these rolls in antifriction bearings, with suction press rolls, and with felt conditioners. With such an arrangement, felts could be run comparatively slack. The result would be open pores and little or no washing. If washing should become necessary, there would be no need of roping. The felt could be treated with a suitable chemical cleaner.

In most mills, felt service is reckoned in terms of paper tonnage. This method is not equitable since it does not take into account that tonnage may be reduced for other causes than felts. Yet the life of the felt once placed in operation is decreasing all of the time.

Ordering felts wider than necessary is another factor in felt costs. It is not uncommon on old machines, however, to run a felt 10 inches wider than necessary. Such a felt is required to take care of the narrowing up caused by sprung felt rolls.

Hard press rolls require tighter felts than do soft rolls since they tend to crush paper more readily.

A suction press roll with a brass shell may contribute to shorter felt life by cutting a felt which for any reason should run into a wrinkle. Short bends in a felt likewise cause felt deterioration. Then, too, felt life is shortened by the advanced position of the top press roll in some hookups, which, however, should not be altered because of the better functioning of the press.

A felt being hauled over a suction box is subject to much wear when running normally. However, this wear is much greater if a press upon which such a felt is run is loaded lightly and the suction box holds the felt so that the peripheral speed of the press roll is greater than the lineal speed of the felt.

Slippage is characteristic of presses not provided with a compensating drive mechanism. Such a drive supplies power to the top as well as to the bottom roll with resultant prolonged life of the felt.

Sometimes when the seam of a felt runs out of parallel, a portion of one or more carrier rolls is enlarged to inch the felt in the area of roll enlargement forward. To what extent a felt suffers by straightening a seam in this manner is not readily determined. However, it probably is better to use such a roll to keep a seam straight than it would be to allow the seam to run crooked.

A good technique for machine tenders to remember in regard to the operation of press felts is: Run felt seams straight. Do not overstretch the felts. Wash the felts when they need it.

Roll Weight Gauge

D. S. DAVIS

Wyandotte Chemicals Corporation

▶▶▶ AFTER WINDING, it is common practice to weigh the roll of paper and to record the weight on the end of the roll or on a ticket. Errors of 200 to 500 pounds in reading the dial of the scale are all too frequent, and since accurate weights are of importance in subsequent operations, a rapid means of checking roll weight is of interest.

For rapid checking purposes in a crowded storage room a graduated stick is sufficiently accurate. It is the purpose of this article to describe how such a gauge can be prepared. The stick should be graduated so that when one end rests on the core the weight of the paper can be read at the edge of the roll. Suitable sticks are ¾ in. square and 18 in. long. The four faces serve for four combinations of roll width and core diameter.

As derived previously (THE PAPER INDUSTRY AND PAPER WORLD, *24*, 373, 1942), the fundamental equation for calibration is

$$M = \frac{6.614\, R\, b\, A\, (A + d)}{c} \times 10^{-6} \quad (1)$$

where M = weight of roll, pounds
R = basis weight, 25 x 38 in., 500
b = width of roll, inches
A = distance, core to edge of roll, inches
d = core diameter, inches
c = average caliper, inches

In graduating, for instance, one face of a stick for 84-in. rolls wound on 5.575-in. cores when the basis weight-caliper ratio (R/c) is 14,960, substitute these values in Equation 1, arriving at

$$M = 8.31\, A\, (+ 5.575) \quad (2)$$

From Equation 2 prepare a comparison of values of M and A similar to the accompanying table, plot these values on ordinary plotting paper and read from the graph the values of A corresponding to intervals of 100 pounds in M.

A	M	A	M	A	M
2	126	7	733	12	1751
3	214	8	902	13	2005
4	318	9	1089	14	2275
5	440	10	1293	15	2564
6	577	11	1514	16	2865

This defines the graduations on one face of the stick. The other faces can be calibrated to cover other roll widths, core diameters and basis weight-caliper rations. The finished gauge should be varnished.

When recorded roll weights do not agree with the gauged values within 4 per cent, the former are probably in error and rolls in question should be marked for reweighing.

What Makes an Electric Motor Run?

R. H. ROGERS
Industrial Engineering Div.
General Electric Company

▶▶▶ AN ELECTRIC MOTOR consists of two members, one that is stationary and one that can revolve (Figure 1). Each has electric conductors in or around parts made of thin steel laminations, together with such supports and fastenings as are necessary to make them usable.

When electric energy is supplied to the conductors, the member that is free to turn revolves and delivers mechanical power through a belt, chain, gear, or coupling to the driven machine.

Fundamental Principle

If a magnet that is free to turn is brought near a fixed magnet, the free magnet will turn to line itself up with the fixed one with its north and south ends opposite the south and north ends of the fixed magnet (Figure 2). This is a fundamental principle of magnetism—*unlike poles attract; like poles repel.*

When the free magnet turned, it did so vigorously, twisting the suspending thread. *It did mechanical work.*

Fig. 1—An electric motor has a stationary member and a revolving member. It converts electric energy into mechanical power.

Fig. 2—The north pole of the free magnet is attracted to the south pole of the fixed magnet.

Fig. 3—A magnetized needle suspended by a thread with swivel has no reason for revolving.

Fig. 4—This series shows how the needle revolves as it follows unlike poles in rotation.

Fig. 5—Electromagnets are strong and controllable.

Fig. 6—The motor-frame can be stationary with the shaft revolving or the shaft can be stationary with the frame revolving.

Fig. 7—The men on the inner circle are being kicked and pulled along. The men on the outside circle reverse their attitudes as the inner men pass by.

Fig. 8—The poles of the revolving member are kicked and pulled by the poles of the stationary member. Watch the arrowed N.

Fig. 9—The arrowed N has moved to a new space but it again has an N behind it and an S ahead.

Fig. 10—A magnet in an alternating-current circuit.

Fig. 11—In a direct-current motor, just as a moving north pole comes to a fixed south pole, its coil terminals (commutator bars) contact brushes of opposite polarity and the moving pole becomes a south pole.

Fig. 12—The moving south pole is now trying to get away from the fixed south pole.

Fig. 13—In an alternating-current system, voltage (pressure) and current (flow) rise from O to a peak and then decay to O twice in a cycle—once each way.

Rotation Established

Suppose one bar of iron is laid across another and a magnetized needle is suspended by a thread over the crossing point. Since the iron pieces are not magnetized, the suspended magnet can point in any direction (Figure 3).

Now, if by some means, the bars are magnetized and demagnetized so that given poles appear in rotation, the free magnet turns to follow the successive locations of north and south poles. The free magnet is thus made to revolve continuously and we have a miniature motor (Figure 4).

Electromagnets

We have means for rapidly magnetizing and demagnetizing iron and reversing its north-south characteristic. A coil of wire around iron will make a magnet of it when electric current is passed through the wire. If the iron is of the proper kind it will lose its magnetism almost instantly when the current is shut off. If the current is started again in the reverse direction the iron will be magnetized with N-S where S-N was before. The polarity is said to be reversed (Figure 5).

This is an electromagnet—much stronger than a permanent magnet and subject to control; i.e., ON-OFF-REVERSE with great rapidity.

Push and Pull

To go back to the motor—both the stationary member and the revolving member are largely electromagnets since the windings, through which electric currents flow, are wound around sections of iron. These sections of one member will be made alive-dead-alive again with polarity reversed in a regularly repeated cycle. The sections of the other member will stay alive with polarity unchanged.

The reaction—push-pull—between magnets makes it possible to hold either member still and to let the other member revolve. The effort that makes a motor shaft revolve one way is trying equally hard to revolve the stationary part the other way. Whichever member is free to turn will turn (Figure 6).

Motors are built with the constant polarity member (i.e. magnetized needle, in the example) either rotating or standing still and conversely with the reversing polarity member standing still or rotating. Circumstances of design determine which way it will be.

The poles on the rotating member are kicked along by the poles behind and pulled along by the poles ahead (Figure 7). As soon as a pole "comes abreast" of the pole that is pulling it, polarity changes and a new set of kicks and pulls are established. The sum total of all the kicks and pulls on all the poles of the rotating member is the turning effort or torque of the motor.

There are strategic times at which to reverse polarities in each revolution (Figures 8 and 9).

How Poles Are Reversed

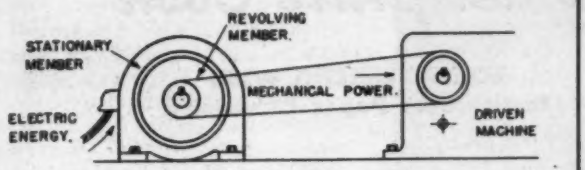
Reversals are effected with time precision in one of two ways. With alternating current, the alternations themselves reverse the polarity of a magnet with each reversal of current flow (Figure 10). The current and hence the poles in one member reverse 120 times per second when the electric system has a frequency of 60 cycles per second.

In direct-current motors the reversals are caused by the revolving member itself through something like sequence valving action of the commutator and brushes.

By the time a pole on the rotating member has reached the point of greatest attraction (A in Figure 11), its polarity is changed because its commutator bars (B-C in Figure 11) (terminals of the coils) have passed to brushes of opposite sign (B-C in Figure 12). That is, the bars that were in contact with plus and minus brushes are now in contact with minus and plus brushes and current through the magnetizing coil is reversed. What was a north pole in Figure 11 is a south pole in Figure 12.

Note, with direct current, one power line is plus and the other minus all the time, while with alternating current the lines change through plus-and-minus to minus-and-plus with great rapidity (Figure 13).

To recapitulate then, we may say that a motor runs because poles of one polarity are chasing after poles of the opposite polarity and are being pushed along by poles of the same polarity. But, will-of-the-wisp like, the moving poles never get to the attracting poles because that desirable point is always just ahead, because of the timely reversals of current in alternating-current motors, or the equally timely action of the commutator in direct-current motors.



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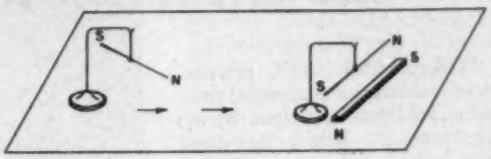

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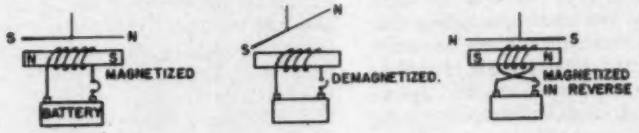

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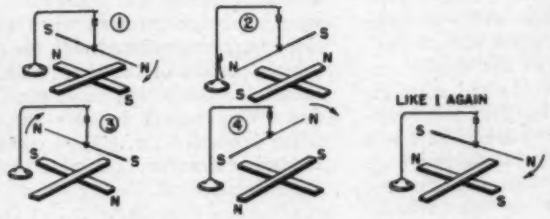

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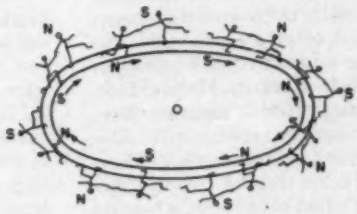

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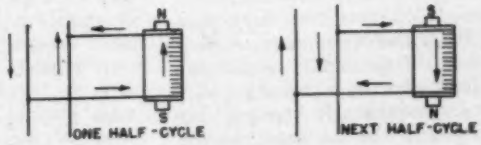

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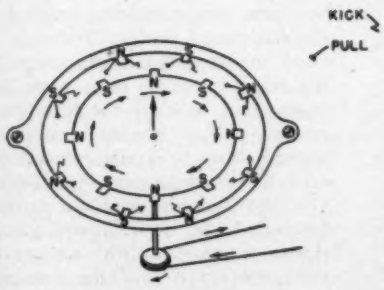

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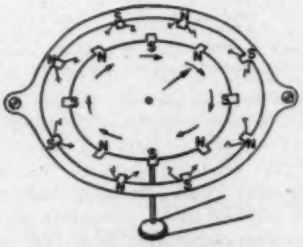

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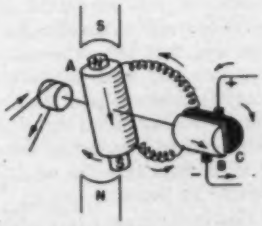

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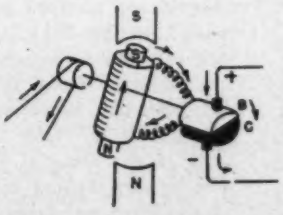

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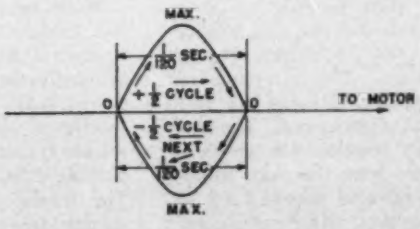


13

SABOTAGE *in the Sulphite Cook*

LOUIS ELSBERG WISE
Institute of Paper Chemistry

▶▶▶ FOR YEARS PAST, practical men have realized that pine wood from old trees could not be pulped by the sulphite process. When the wood was rich in heartwood, delignification proved to be impossible. On the other hand, young pine trees, containing little or no heartwood, could be pulped quite readily (*1*). It also has been known that unbarked spruce logs that have been floated and kept in water for protracted time periods, failed to give pulp readily, and that spruce branchwood chips misbehaved in the sulphite digester (*2*).

Various hypotheses have been offered to explain these phenomena, but only in recent years have we had some real light on the subject of this abnormal behavior of pine heartwood. The pathfinding work has been largely that of a Swedish scientist, Holger Erdtman, although other chemists have made their contributions as well. It is simply another instance—one of many—in which the organic chemist has served the technologist, with insight and distinction.

Pine heartwood, besides resisting the sulphite cook, is extremely resistant to decay and to insect attack. The "lightwood" of cutover southern pine forests bears mute testimony to this. Heartwood stumps remain, jagged and intact, long after the sapwood has disappeared. Interestingly enough, this durability and the resistance to the sulphite cook are properties related to each other.

The fact that pine heartwood differs so greatly in its behavior from that of the sapwood was attributed to its high resin content. An obvious explanation was that the sapwood was low in resin, and that the cooking liquor could penetrate into the chips. Heartwood, on the other hand, was high in resins, and its pores were so clogged with rosin that the wood was impermeable to the acid liquor.

That this was a great oversimplification was shown by experiments that long preceded those of Erdtman. For example, in 1926, Schwalbe and Berndt (*3*) extracted pine heartwood exhaustively with benzene (a resin solvent), and found that the residual chips could not be pulped by the sulphite process. This surprising result was explained as being due to a "dehydration" phenomenon. The benzene not only extracted the resins, it removed water from the chip, and so left a horny material that had lost its swelling properties, and its permeability to the acid liquor. The following year, however, Hägglund (*4*) showed that pine heartwood that had been pre-extracted with benzene, and *then* extracted with *alcohol* or with *acetone*, could be pulped quite readily by the sulphite method. This pointed to the strong probability that the heartwood contained some alcohol- or acetone-soluble matter that interfered with delignification. Later, Hägglund amplified his experiments (*5*), and his results were fully corroborated by Schwalbe and af Ekenstam (*6*).

These two chemists extracted pine heartwood with ether. They also extracted the original wood with alcohol, and they fractionated the alcohol extracts into ether soluble and ether insoluble portions. They used these various extracts to impregnate wood which at the outset was readily pulped (*e.g.* spruce wood) and then subjected the impregnated chips to the sulphite cook. A part of their data are summarized in Table I. Their conclusions were that pine heartwood contained substances of "acid character," soluble in alcohol or acetone, and that from these extracts, ether or benzene was then capable of dissolving materials

Table I—Effect of pine heartwood extractives on the pulping of spruce wood

Impregnation with an alcoholic solution of	Results of the sulphite cook
Ether extract obtained directly from the wood	Pulping satisfactory
Total alcoholic extract	Wood not pulped
Ether soluble portion of the alcoholic extract	Wood not pulped
Ether insoluble portion of the alcoholic extract	Pulping satisfactory

which (though present in small amounts) were seriously hampering the sulphite cook. *Strangely enough, the ether extractives dissolved out of the original wood did not interfere with pulping.* Neither did the *ether-insoluble* portion of alcohol extract.

Much later, Hägglund, Holmberg and Johnson (*7*) showed that if pine heartwood was extracted exhaustively first with ether and then with acetone, the *acetone extractives were largely soluble in ether.* It was this ether-soluble fraction which gave rise to the pulping difficulties already mentioned. The results of all these preliminary studies are summarized as follows: When the pine heartwood chips (which could not be pulped by the sulphite process) were extracted with ether, the pine wood residue did not lend itself to pulping. When, however, pine wood residue was extracted further with acetone or with alcohol, it could be pulped readily. When (easily delignified) spruce chips were impregnated with the original ether extract from the pine wood, they still could be pulped. When, however, they were impregnated with the soluble matter extracted by alcohol or acetone, pulping was inhibited. This same inhibition occurred when spruce chips were impregnated with the ether soluble portion of the resins extracted by acetone or alcohol from pine residue. This would indicate that the ether "solubles" of the acetone or alcohol extractives of pine inhibit the sulphite cook.

It was at this point that Erdtman (*8*), stimulated by Hägglund, and reinforced by years of experience in the chemistry of wood, stepped into the picture. First of all, he showed that when acetone-extracted pine heartwood was impregnated with a solution of the "acetone resin," the latter could be readily and quantitatively re-extracted from the wood by means of ether. The acetone resin was not strongly sorbed by the wood. It looked, therefore, as though these substances originally were protected by some ether-insoluble material in the heartwood. Next, Erdtman isolated the compounds that sabotaged the sulphite cook. By a painstaking purification, in which the ether-soluble portion of the "acetone resins" were filtered through aluminum oxide two crystalline compounds were isolated. One was shown to have the molecular formula $C_{14}H_{12}O_2$ (*A*) and was evidently the first cousin of the other substance which could be formulated as $C_{15}H_{14}O_2$ (*B*). After repeated crystallization, first from benzene, and then from methanol or glacial acetic acid, *B* was obtained as a pure compound, melting at 112-3 C. From the original mother liquors of *B*, after crystallization from xylene, purification through aluminum oxide, and recrystallization from glacial acetic acid, *A* was obtained in the form of fine needles melting at 155.5-156 C. *A* was christened *Pinosylvin* (from its progenitor *Pinus sylvestris*, Scotch

pine), and *B* was its monomethyl ether.

Both *A* and *B* could be methylated further and both gave the identical dimethyl derivative [(*a*), Table II], which on oxidation yielded a mixture of benzoic acid and 3, 5-dimethoxybenzoic acid. This evidence, together with the formation of derivatives listed in Table II, and the complete synthesis of the compound (*a*) by Gunhild Aulin-Erdtman and Holger Erdtman (*9*), brought assurance that pinosylvin (*A*) was a rare phenol that could be designated as 3, 5-dihydroxy-*trans*-stilbene. The complete formulations of *A* and of *B* are shown herewith. Pinosylvin appears to be very toxic to microorganisms, and is at least as good a preservative as creosote. In ultraviolet light it gives an intense purple fluorescence, a property which is also imparted to the heartwood, and which permits differentiation of sapwood and heartwood chips. Despite the fact only about 0.8 per cent of the mixed phenols was present in heartwood, the mixture proved to be a powerful inhibitor of the sulphite digestion. Wood that could be pulped readily, when impregnated with *A* or *B*, lost its pulping qualities in the sulphite digester.

As a result of Erdtman's work, a number of questions naturally arise. Can other, more common, phenolic substances also inhibit the sulphite cook? If so, what is the mechanism of this inhibition? How is it that an ether extract of the original wood contains neither pinosylvin nor the methyl ether when both of these compounds are very soluble in ether? What "protects" them against the initial ether extraction? Are *all* failures in the sulphite cook to be attributed to the presence of phenolics?

Erdtman has been able to answer some of these questions. He showed that a number of the common phenols were quite active in stemming delignification. Among them were: resorcinol, pyrogallol, phloroglucinol, and alpha-resorcylic acid (which is closely related to *A*) as well as the naphthoresorcinols. On the other hand phenol itself and pyrocatechol had little effect. When a "normal" sulphite cook was attempted with spruce wood, in the presence of resorcinal, pulping was not effected and the chips retained most of the original lignin. This inhibition was apparently due to the chemical interaction of lignin with the phenol, *under conditions of high acidity*. Normal, complete sulphonation is prevented, and the partially sulphonated "phenolated lignin" remains in the chip. These findings are in harmony with those of Hägglund

Dr. Holger Erdtman, of The Institute of Cellulose Technology and Wood Chemistry, Stockholm School of Technology.

for the normal sulphite cook. (*10*). In the ordinary sulphite cook, there is a sulphonation of the lignin in the solid phase. Due to the close union between lignin and the hemicelluloses, the lignosulphonates formed at this stage remain insoluble. As the cook progresses, with increasing temperature and acidity, further sulphonation takes place, but there is also a hydrolytic fission between the lignosulphonates and the carbohydrates, with concomitant solution (and removal from the chip) of the lignosulphonates. With phenolated lignin, as in pine heartwood, groups ordinarily sensitive to sulphonation have been blocked, and the altered lignin is not removed.

Erdtman believes that there may be at least two substituent groups in the lignin of conifers (*11*). Their reactivity towards sulphite cooking liquor is quite different. The one substituent reacts readily with sulphites in the acid, neutral or alkaline range. This same group also reacts readily with phenols *under strongly acid conditions*. Under other conditions it reacts with phenols very slowly or not at all. The other substituent reacts very rapidly with the sulphite liquor under acid conditions, and very slowly or not at all with the phenols (over a wide *p*H range). When wood has been extensively sulphonated in the absence of interfering phenols, it can be pulped readily. When a wood like spruce is cooked with very weakly acid liquor, *even in the presence of phenols*, the first substituent group appears to be sulphonated, not phenolated. When the cook is carried further with normal cooking liquor, sulphonation of the second group takes place, with formation finally of a soluble lignosulphonate. The different reactivity of these two groups would explain the possibility of a two stage cook for pine wood. It would also explain why the weakly acid sodium bisulphite may be used to delignify pine heartwood, when ordinary cooking liquor fails.

When spruce wood is cooked with ordinary cooking liquor under normal conditions in the presence of phenolic inhibitors, the unpulped residue is high in the corresponding phenol-lignin, which is only slightly sulphonated. These phenol-condensation products remain largely in the solid phase; they are removed from wood with exceeding difficulty and very slowly. It is also interesting that such small amounts of the reactive phenols can be such powerful inhibitors. Sulphonation and phenolation, which compete with each other, are also contingent on the temperature of digestion and on the cooking schedule. When pine heartwood, or when spruce wood cooked in the presence of resorcinol, is heated *very slowly* with a sulphite cooking liquor, the dominant reaction involves sulphonation. When cooks are carried out with rapidly increasing temperatures, phenolation

Table II—Derivatives of Pinosylvin

Type of reaction	Compound formed
Methylation of *A* or *B*	(*a*), Dimethyl derivative of *A*, $C_{14}H_{10}(OCH_3)_2$, melting at 56-7 deg. C.
Acetylation of *A*	(*b*). Pinosylvin diacetate, needles, melting at 100-1 deg. C.
Benzoylation of *A*	(*c*). Pinosylvin dibenzoate, needles, melting at 150-1 deg. C.
Benzoylation of *B*	(*d*), Pinosylvin monomethyl ether-monobenzoate, coarse prisms, melting at 84.5-86 deg. C.
Catalytic hydrogenation of *A*	(*e*), One molecule of hydrogen is taken up, yielding an oil.
Benzoylation of (*e*)	(*f*), Dibenzoate of (*e*), $C_{28}H_{22}O_4$ thin prisms or scales, melting at 126-7 deg. C.
Bromination of (*a*)	(*g*), 2,6-Dibromo-3,5-dimethoxystibene dibromide, prisms, melting at 190-192 deg. C.
Hydrogenation of (*a*)	(*b*), 3,5-dimethoxy-dibenzyl, colorless oil, boiling at 337-9 deg. C. and readily converted to (*i*) below.
Hydrogenation of (*g*)	(*i*) 2, 6-Dibromo-3,5-dimethoxy-dibenzyl, silky needles, melting at 141-2 deg. C.

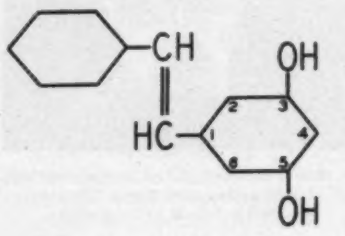
also takes place. Hence in slow cooks, delignification is more nearly complete.

The simplest explanation of the fact that wood, exhaustively extracted with ether, gives an "acetone resin" that contains ether-soluble material (like pinosylvin), is that ether-insoluble membranes are present in the wood, and that these prevent access of the ether to the pinosylvin (6a). The "membranes" are readily soluble in alcohol and in acetone. The concept of such membranes is not new. Hägglund, Holmberg and Johnson (7) assumed that there were semipermeable membranes in heartwood, and that while they were penetrated by cooking liquors, they remained impermeable to the macromolecules of the lignosulphonates. Another observation of these authors is of interest in connection with Erdtman's work. They found that when pine heartwood *shavings* that had been exhaustively extracted with ether, were reduced to a *powder* and then *reextracted* with ether, this second extract contained appreciable amounts of resinous materials. The assumption is that the ether insoluble membranes were partially ruptured by fine grinding, and that the ether-soluble portion of the acetone resin then became accessible to the ether.

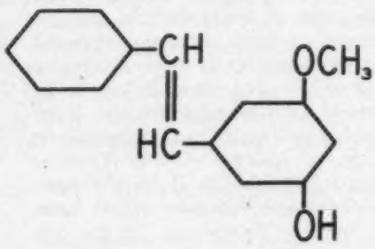
If membranes exist, Erdtman showed that they were probably "injured" by hot water, inasmuch as water extractions permitted the later removal of small amounts of pinosylvin. The action of water, however, was far less marked than in the case of acetone or alcohol.

What is the nature of these membranes? Erdtman has given a partial answer to this question. The membrane substance seems to be quite closely related to the "lignans," which the reader may recall were described in a previous article in this journal (*12*). "Pinoresinol," (a lignan), a component of many pines, is also a phenol, but is evidently very different in chemical composition from pinosylvin. The membrane substance appears to be very similar to a pinoresinol that has been heated with acids, and may therefore be a lignan polymer. Vanzetti (*13*) has suggested that, under normal conditions, the lignans may be precursors of lignin, and that under other conditions they may give rise to resins. In any event the so-called membranes appear to be present in other conifers (besides Scotch pine), and they represent but a very small fraction of the wood.

Erdtman also gave a brief report on other substances which are found in various pines. These need not be listed here. Many of them are flavones. It is interesting to note, however, that some of the common American pines, (raw materials in the sulphate pulping process) contain in their heartwood pinosylvin or its derivatives. Thus the soft white pine (*P. strobus*) contains the monomethyl ether (*B*);



"A"-Pinosylvin
(3,5-Dihydroxy trans-stilbene)



"B"-Monomethyl ether

Figure 1

longleaf pine (*P. palustris*) the mono- and the dimethyl ethers; and jack pine (*P. banksiana*) the monomethyl derivative of pinosylvin.

It is evident that small amounts of phenolic compounds will prevent the commercial pulping of pine heartwood if normal sulphite cooking conditions are adhered to. What about spruce *branch* wood, which is also difficult to pulp? Are the conditions here the same as in pine heartwood? According to Erdtman (*2*), the answer would be in the negative. In spruce branchwood, the high resin and fat content actually prevents penetration of the liquor into the chip. When these extractives are removed, branchwood can be pulped. When floated, unbarked spruce wood has been kept in water for long periods, and is then barked and chipped, sulphite pulping of the *outer* woody layer is difficult. Here (Erdtman has shown), phenolic substances probably derived from the bark, are actually present in the outer wood and act as inhibitors in the cook.

The importance of Erdtman's work lies in the stimulus that it gives to other investigators. Chemists must be alert to the presence of extraneous materials even though they may be present in very small amounts. Extremely durable woods, woods high in coloring matter, or rich in acetone-soluble material, or which contain substances toxic to invertebrates, all must be viewed with suspicion as raw materials for normal sulphite pulping—but they should also prove to be interesting from the standpoint of future research.

Appreciation—Grateful acknowledgment is made to Miss Eda Nihlen for her work on the figure used with this article.

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Care of Artificial Pulpstones

BERNARD BORNSTEIN
Pulpstone Technical Adviser, Norton Company

▶▶▶ SOME YEARS AGO, when artificial pulpstones were passing through the development stage, stone failures were experienced. These failures resulted in the finding that a stone strong enough for one mill was too weak for another. One fact that prompted this observation was the increased amount of power used by some mills (up to 50-100 per cent higher) when compared with other mills using the same type of grinders. In these instances of higher power consumption, no provisions had been made for better control of the grinding operation or for improving the operation itself by installing better showers, equipping the grinders with temperature controls, streamlining the pits, allowing more clearance between the individual stone and its grinder casing, and by keeping a closer check on finger bar clearances.

This situation prompted the production of a pulpstone that would stand up under any pressure at which good pulp could be ground. Yet it was difficult for the stone to take care of the expansion and contraction incidental to sudden temperature variation and more important to the drastic burning of the stone surface. The result was cracked segments.

In order to meet the demands for greater production, a still stronger stone had to be produced. After several changes of design, a stone with thinner abrasive segments was introduced. This stone was capable of absorbing heat more quickly without cracking the segments. Likewise, the price of the stone was reduced in proportion to the smaller amount of usable abrasive, thus permitting a comparably shorter service life.

Now, after years of research, artificial pulpstones have been developed that can withstand uniformly high pressures and temperatures without damage. However, there is one important factor to keep in mind and that is: the higher the power applied, the more heat from friction is created. A more positive means should be provided to eliminate this additional heat at a uniform rate to prevent it from becoming localized.

Starting Up and Operating the Stone

The artificial pulpstone, when contrasted with the natural stone, will produce satisfactory pulp much sooner after being placed in operation. When a stone is cold, it is best to start up at the temperature of the shower water, and to increase the temperature in steps of 5 Fahr. every fifteen minutes until the desired temperature is reached. Then this temperature should be maintained without wide fluctuation.

The shower water should hit the stone just above the pit stock level. Better pulp can be produced at consistencies between 4 and 5 per cent. Such consistencies provide best lubrication for the stone. If a stone is too fine for the type of pulp desired, higher densities would be necessary to get freer pulp, but such operation is not advisable.

Causes for Breakage

Stone failure usually is the direct result of overheating or of excessive temperature variation rather than any defect in the stone itself. When a stone burns, it usually lasts but a few seconds. This overheating of the stone seldom shows on the temperature chart since it usually is in one spot around the stone.

The damage to a burned stone depends upon the severity of the burn, which sets up tremendous stresses, causing cracked segments.

Some pulp mills have practically no stone failures, while other mills frequently have them. In many cases, stone breakage has resulted from an accumulation of shims. Sliver catchers hold these shims until they are packed in solidly, causing the stone to run hot and then to cool off rapidly when the shower is increased, whether automatically or by manual control. Such rapid temperature changes eventually may loosen the segments of the stone.

Some pocket grinders have sliver catchers, located under the bridge trees between the cylinders, which pack in the slivers so solidly that they often make starting difficult. Likewise, because of the increased friction, they cause a definite loss in power.

Sliver grinders installed on some of the larger grinders do not function properly. When shims are present and shower water runs low, burning is likely to occur. Even when there is sufficient water on the stone, an accumulation of shims will cause temperature variation.

Operating Recommendations

To insure against stone failures, the following recommendations should be followed:

1) Whether fresh or white water is used, always keep the showers directly on the stone. Make sure that shower holes are never plugged. Where there also are top showers, use only enough water to allow the main rear shower to operate properly. The amount of top shower water used varies considerably from mill to mill depending upon the rate of production. The rear shower may be shut off much of the time, particularly if temperature controllers are used, when too much water is supplied by the top showers or from leaky cylinders.

2) The dam should be at an angle sufficient to assist the clearing of shims and to help reduce the friction of heavy stock.

3) All obstructions or devices designed to hold back slivers should be removed. The best sliver catchers yet developed are *closely set finger bars.*

4) The corners of the grinder pit should be rounded to help prevent the accumulation of dead stock, and the bottom should have enough slant to facilitate stock passage. If the space under the stone is too shallow, it will be difficult to maintain proper consistency. If it is too deep, the pulp and slivers will not flow freely.

5) Since most of the pulp ground falls off the sides of the stone, the spaces next to the casing must be kept clear to allow free stock passage.

6) To permit observation of the consistency and rate of stock which flows across the dam, the pits must never be covered. Open pits also facilitate the periodic use of a rake to remove shims before a stone runs hot or burns.

7) When a sharpening lathe is located on the top of the grinder, shims should be cleared out of the space before they pack, even if it is necessary to remove them many times a day.

Wood is now being ground that never before would have been accepted. Some of it is dry, rotten, knotty and of mixed species, all of which present difficult problems.

Due to poor wood and indifferent help, grinder pockets may be poorly loaded with resultant jams and power fluctuations.

Present practice has eliminated considerable amount of the drastic burning of some years ago; but temperature fluctuation, due to shims, should be reduced. It is a real threat to the life of the artificial pulpstone.

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LARGE CHLORINE PLANT COMPLETED IN W. VA.

Completion of the largest chlorine plant ever built as a single unit east of the Mississippi River was announced November 19 by Columbia Chemical Division of Pittsburgh Plate Glass Company, operators, and The H. K. Ferguson Company of Cleveland and New York, industrial engineers and builders.

Located at Natrium, West Virginia, in a section noted for its wealth of natural resources, the new plant was constructed on schedule and has been in operation for more than a month. It was financed by Defense Plant Corporation.

In addition to manufacturing liquid chlorine—used for hundreds of industrial applications for war materiel—the plant also produces caustic soda as a co-product. Exact capacities were not announced, although Ferguson engineers, leaders in the field of chlorine plant construction, said the plant was "almost as large as the biggest ever built as a single unit at Las Vegas, Nevada." That plant was designed by The Ferguson Company.

Commenting on the size of the new facility, it was pointed out that there are plants east of the Mississippi with greater capacity than the new Pittsburgh Plate installation, but they were expanded over a period of time rather than having been designed as a single unit.

The new plant is located on the bank of the Ohio River, about 35 miles below Wheeling, adjacent to one of the richest salt veins in that area. The site was chosen by Pittsburgh Plate and Defense Plant Corporation officers because of the availability of salt, basic raw material, coal and both water and rail transportation.

The plant consists of six principal buildings, all functional in design and construction, and some making use of secondhand steel frames. They include a chlorine manufacturing building, machine shop, power house, caustic manufacturing building, administration building, and combination employment office and gate house.

EDITOR'S NOTE: The contents of this announcement have been approved by the War Department Bureau of Public Relations, Defense Plant Corporation and the Office of Censorship.

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ALLIED INDUSTRIES HEAR ARTHUR MOTLEY ON POSTWAR PLANNING

Arthur H. (Red) Motley, publisher of the *American Magazine* and vice chairman of the National Speakers Committee of the Committee for Economic Development, discussed the work of this Committee at the monthly luncheon meeting of the Allied Industries Luncheon Club held at the Commodore Hotel November 8.

Mr. Motley, drawing from his own business experience and contact with business executives in every part of the country, emphasized the necessity of taking a positive attitude about the objectives of American business in the postwar period. He quoted Thomas Carlyle who wrote, "Doubt of any kind can be ended by action only," as the text for his belief that action, not theories, must be the basis of postwar development in the United States. Moreover, Mr. Motley said that he was skeptical about over-all planning which too often ended in "paralysis by analysis." In contrast to theoretical planning, the speaker emphasized the necessity for action by business men in the form of concrete and practical policies which will insure increased production in the postwar period and a high level of employment.

Mr. Motley made it certain that in his opinion the objectives of the CED are practical and can be attained if American business has sufficient courage and initiative. Mr. Motley said that when World War II started we had not yet solved the problem of the last business depression which the present war ended but did not solve, and finally, he warned that the war might end quickly and find business unprepared. It is for this reason that postwar planning is necessary now.

◆

CHICAGO BRIDGE HAS NEW CONTRACT FROM THE NAVY FOR LST'S

At the Seneca (Illinois) yard of the Chicago Bridge & Iron Company, LST's are being launched at the rate of one a week. The company has just completed its first program under contract for the Navy approximately three weeks ahead of schedule.

Announcement is now made that the Chicago Bridge & Iron Company has received contracts from the Navy for a new program, calling for 150 per cent more LST's than the company built under the first program. Under the new program, completion will be stepped up. The ships built at this yard are 98 per cent complete when launched. The engines are installed, all equipment is in, and all piping and wiring ready for the operation of the ship. The hulls are built largely from prefabricated sections shipped from the company's plants at Birmingham, Chicago, and Greenville (Pa.).

The announcement from the company states that its Seneca shipyard has been made the "lead yard" in the U. S. Navy's LST construction program. Gibbs and Cox, Inc., Marine Architects of New York, have been retained to make plans and issue purchase orders for all yards building LST's.

◆

▶▶▶ SEVERAL ADDITIONS to the company's sales and service organization have been announced by Wheelco Instruments Company, Chicago. New England representation has been strengthened by the appointment of Cochrane Steam Specialty Company, Boston, to serve with George W. Hall, the company's present representative. C. L. Clark, formerly attached to the company's Cleveland office, has been placed in charge of a Western New

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York office in Buffalo. Charles D. Mount has been named sales and service representative for Southern Ohio and Northern Kentucky, with headquarters in Cincinnati. H. E. Holling has been appointed Northwestern Illinois representative with headquarters in Peoria. The Lang Company, Salt Lake City, has been appointed sales and service representative in Utah, Idaho, Wyoming, and Nevada.

◆

▶▶▶ THE ARMY ORDNANCE BANNER for meritorious production has been awarded to the Acme Steel Company, Chicago. The citation gives recognition for supplying Ordnance with normal and emergency demands promptly and with the greatest degree of co-operation. Capt. L. C. McEvoy, an ordnance officer, made the presentation to employee representatives of the Acme office and factory.

◆

▶▶▶ CHRISTMAS BONUS CHECKS totalling more than $43,000 have been mailed to the 700 men and women of Acme Steel Company, Chicago, now in the armed services. Those who were in the company's employ for more than six months prior to their entry into the Army or Navy, will receive a bonus equivalent to two weeks' salary, or eighty hours' pay at basic hourly rates. Those with less than six months' service with the company will receive a check based on one week's salary, or forty hours' pay at basic hourly rates.

◆

▶▶▶ SHOP POSTERS developed by Foote Bros. Gear and Machine Corporation, Chicago, are part of an active program to stimulate workers to increased effort. These posters tell a graphic story of how the company's products are serving the Army and the Navy. A theme used as part of the poster campaign was a telegram sent to the men and women of Foote Bros. by Rear Admiral E. L. Cochrane, USN Bureau of Ships. The Rear Admiral notified the employees of the active part the gears they are making are playing in naval action.

◆

NATIONAL VICTORY GARDEN AWARD TO MANHATTAN RUBBER

The Highest Award in the National Victory Garden Institute competition was given to The Manhattan Rubber Mfg. Division of Raybestos-Manhattan, Inc., Passaic, New Jersey, for "outstanding contribution to the Victory Garden Program of 1943."

The ten and one-half acre Victory Garden project was worked by Manhattan employees at all times of the day and night, as they work on clock 'round shifts. The company did much sparing no expense to make this award possible, such as the leasing of two idle farms, pulling out a dead orchard and other trees, fertilizing, plowing and providing insecticide and attendants.

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▶▶▶ THE FIRST OF ITS NEW SERIES of conservation contests has just been completed by the Metallizing Engineering Company, Inc., Long Island City, New York. These contests are open to users of any type of metal spraying equipment, and are intended to show manufacturers and others how they can save critical metals and time in production and maintenance. Ten cash prizes were awarded; the first prize of $200 being awarded to R. C. Overstreet, Tinnerman Products, Inc., Cleveland, for his description of a faster, more durable way to protect speed nuts against corrosion.

◆

ORDNANCE CITATION TO ATKINS ENGINEER

A citation in recognition of his contribution to armament production has been made by Army Ordnance to Carl W. Noffke, tool engineer of E. C. Atkins and Company, Indianapolis, Indiana. The award was made in brief ceremonies at the Atkins plant by Lt. Col. G. M. Enos on behalf of Major General L. H. Campbell, Jr., Chief of Ordnance, Washington.

The award given Mr. Noffke was for development work in the manufacture of armor plate for armored vehicles which led to more efficient and economical production and significant savings in materials, man hours and machine hours. It is estimated that this work resulted in the conservation of 12,000 lb. of armor plate, 12,000 nuts and bolts, 1,500 machine hours and 7,500 man hours, during the course of manufacturing 1,000 vehicles.

◆

▶▶▶ NEW ASSIGNMENTS in its organization have been announced by The B. F. Goodrich Company, Akron, Ohio. *William S. Richardson,* since 1926 on the staff of the assistant works manager, has been named head of the newly-created chemicals division. *Arthur Kelly,* with Goodrich diversified activities since 1925, has been appointed assistant works manager. *E. F. Tomlinson* with Goodrich since 1927 in various sales capacities, has been made general manager of the company's industrial products sales division.

◆

MANHATTAN RUBBER COMPLETES 50TH YEAR

On October 28, the Manhattan Rubber Mfg. Division of Raybestos-Manhattan, Inc., Passaic, New Jersey, observed its Golden Anniversary. On that date, it also received the Army-Navy "E"" award for excellence of production.

The firm has operated for fifty years without the loss of a single working day. The company started very modestly in the middle of a depression. Its employees now number in the thousands and it has over 1,330 employees in the Armed Forces. There are three gold stars in its service flag.

Frank Cazenove Jones, first president and one of the incorporators of the company, retired in 1903. He was succeeded by the late Col. Townsend who served as president for 26 years until the merger in 1929 which formed Raybestos-Manhattan, Inc. He was chairman of the board until his passing in 1940.

Three Manhattan men are now in their fiftieth year with the company. A large number of employees have seen over 45 years of service and nearly 200 have been with the company more than 25 years.

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▶▶▶ EXPANDING ITS SALES and service facilities, Blackmer Pump Company, Grand Rapids, Michigan, has announced the opening of its new office in the Commercial Trust Building, 15th and Market Streets, Philadelphia. This new office will be in charge of B. Dunkley, an engineer of long experience in the pump field. The area served by this office will include eastern Pennsylvania, southern New Jersey, and a part of Delaware.

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▶▶▶ A CONGRATULATORY MESSAGE from Rear Admiral W. H. P. Blandy, USN, chief of the Bureau of Ordnance, Washington, to T. M. Evans, president of H. K. Porter Company, Inc., Pittsburgh, commended the company's outstanding performance in the production of naval ordnance material. The message closed with the statement: "The Bureau extends thanks and commendation to all of you for your individual efforts in helping to provide the fleet with the best possible fighting equipment."

ARMY-NAVY "E" AWARDS

American Foundry Equipment Company, Mishawaka, Indiana — The white star, which denotes six months of continued meritorious service on the production front, has been awarded this company to be added to its Army-Navy "E" pennant which it received the last of March, this year.

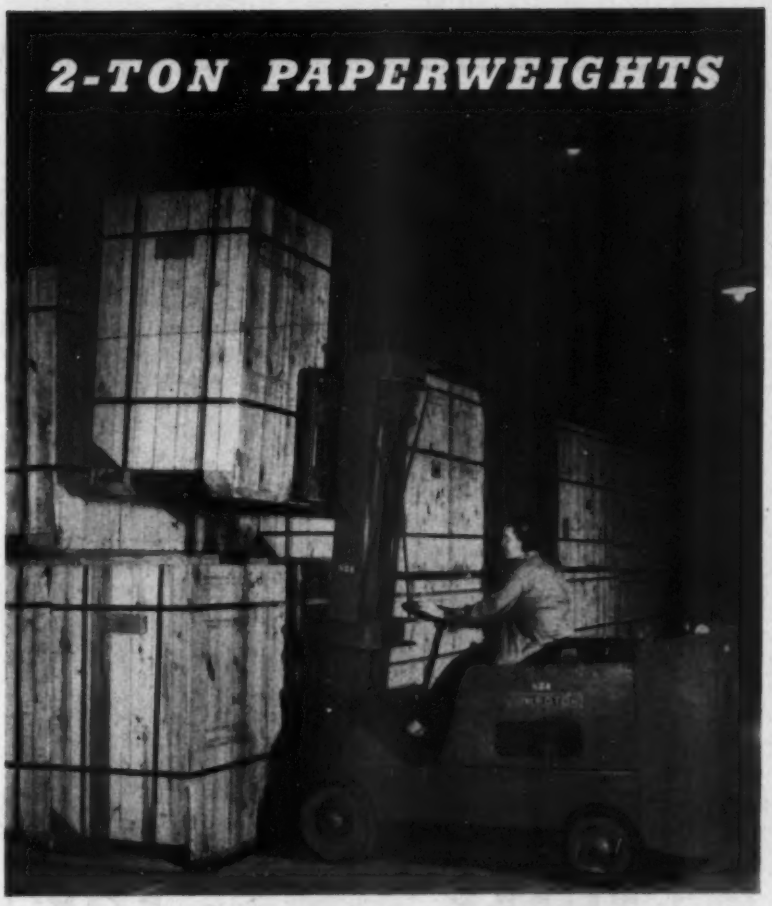
Beloit Iron Works, Beloit, Wisconsin—This company has just been awarded the Army-Navy "E" for excellence in production. The wood shop of the plant was turned over to the ceremonies which were held November 26. The Camp Grant Military Band furnished music, and the pennant was presented to E. H. Neese, president of the company, by Col. Wm. H. McCarty, of the Ordnance Department, Milwaukee. Lt. Miles E. Fraser, USNR, presented "E" pins for the employees to Phil Weber, president of the 25-year Club.

Manhattan Rubber Mfg. Division of Raybestos-Manhattan, Inc., Passaic, New Jersey—On the day that this company observed its Golden Anniversary, it received from the War Department the Army-Navy "E" for excellence. Because of government regulations, no special anniversary ceremonies were held. The War Department rules forbid any other observances on the day the "E" award is presented.

Wm. Powell Company, Cincinnati, Ohio—The U. S. Maritime Commission has awarded this company a gold star to be added to its Maritime "M" Pennant. This award is given for six months' continued meritorious production performance. This company was previously awarded the Army-Navy "E" pennant and the Victory Fleet Flag.

Whiting Corporation, Harvey, Illinois—The Army-Navy "E" pennant was awarded to this company in March, of this year. Six months of continuous meritorious service in production has now won for the company a white star to be added to its "E" flag.

Yale & Towne Manufacturing Co., Philadelphia Div.—Employees of this company held an enthusiastic celebration in the plant on October 29 when the company received the Army-Navy "E" award for excellence. Lt. T. E. Lapres, USNR, made the presentation to W. Gibson Carey, Jr., president of the company. "E" insignia pins were presented to the employees.



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Modern handling systems must be able to load, move and store materials of many sizes and weights. Towmotor power makes it "easy as pie" for the operator (man or woman) to efficiently perform these operations with loads weighing as much as 5 tons. And . . .

That's only part of it! Towmotor speeds your products—sheets, bales, rolls or pulp—to plant destinations at a clip of *880 feet per minute,* and stacks them as high as 25 feet! Add up these facts and what's the answer? Substantial savings in time, money and storage space plus full use of available man or womanpower.

Check further on the material handling results made possible with Towmotor—the one-man-or-woman-gang. The Towmotor "Data File" will give you accurate information for that purpose. For your copy write Towmotor Corporation, 1220 E. 152nd Street, Cleveland 10, Ohio.

TOWMOTOR

THE 24-HOUR ONE-MAN (woman)-GANG

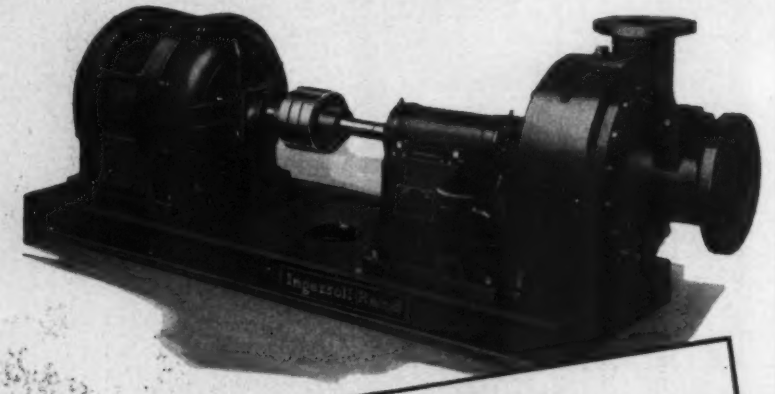
SAFETY

INDUSTRIAL HEALTH AND SAFETY SERVICE—WPB

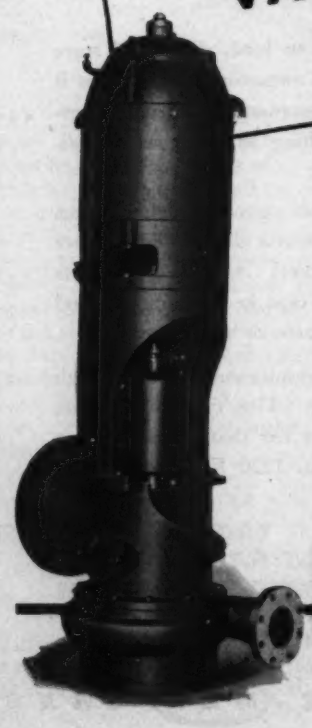
▶▶▶ CHIEF OF THE Industrial Health and Safety Service is John M. Fewkes, of Chicago, former president of the American Federation of Teachers. This appointment was announced last month by Joseph D. Keenan, WPB vice chairman for Labor Production.

The purpose of the Industrial Health and Safety Service is to promote joint labor-management effort to conserve America's manpower resources from wastage through avoidable illness or accident. Unions and labor-management committees will be called upon to take all possible preventive measures to keep industrial manpower at maximum effective strength.

Mr. Fewkes has been head of the health and physical education department of the Tilden Technical High School in Chicago since 1925 and has been associated with the Chicago Board of Education since 1922. He has been granted leave of absence to assume his WPB duties.



THERE ARE NO VACATIONS FOR PAPER MILL PUMPS



Paper stock pumps must be tough. They are often on 24-hour-a-day, 7-days-a-week service—and a shutdown disrupts the whole production schedule.

Ingersoll-Rand Cameron stock pumps are built to meet these conditions. There are the new vertical unit and the well-known horizontal unit—each designed to "stay on the job."

Other Ingersoll-Rand pumps are available to handle practically all of the liquid moving jobs in a paper mill.

Ask the Ingersoll-Rand engineer for complete details. Ingersoll-Rand Company, 11 Broadway, New York 4, N. Y.

Ingersoll-Rand
Cameron Pump Division
10-361

1942 ACCIDENT RATES IN PAPER & PULP IND.

The National Safety Council has just released *Accident Rates in the Paper and Pulp Industries, 1942.* This pamphlet summarizes the 1942 injury records of 286 paper and pulp mills and plants engaged in manufacturing paper products. The 1942 coverage of the industry is the largest ever reported to the National Safety Council.

Highlights of 1942 accident experience show:

1) The average frequency rate was 21.52 reportable injuries per million hours worked—an increase of 13 per cent from 1941.

2) Severity rates averaged 1.74 days disability per 1,000 hours worked—up 6 per cent over 1941.

3) The industry has made substantial net reductions of 63 per cent for frequency and 52 per cent for severity since 1926.

◆

SAFETY SCORES

▶▶▶ IN THE ANNUAL Paper Industry Safety Contest which began July 1, 1943, reports for October show eighteen mills maintaining a perfect record. The mills having a perfect score are:

Division I—Pulp and Paper Mills

Group A—(None)

Group B—
U. S. Gypsum (Insulation Plant), Greenville, Miss.
St. Croix Paper Co., Woodland, Maine.

Group C—
The Flintkote Co., Little Ferry, N. J.
U. S. Gypsum Co., Oakmont, Pa.
Marathon Paper Mills Co., Ashland, Wis.
Spaulding Fibre Co., Inc. (Milton Plant), No. Rochester, N. H.
*Central Fibre Products Co., Tama, Iowa.
*Central Fibre Products Co., Vincennes, Ind.
International Paper Co., Riley, Maine.

Division II—Paper and Board (Remanufacturing)
The Flintkote Co., E. Rutherford, N. J.
Bird & Son, Inc. (Roofing Plant), Chicago.
Thilmany Pulp & Paper Co. (Bag Mill), Kaukauna, Wis.
Kimberly-Clark Corp. (Atlas Mill), Appleton, Wis.
Bird & Son, Inc. (Roofing Plant), Shreveport, La.
Bay West Paper Co., Green Bay, Wis.
South West Box Co., Sand Springs, Okla.

(*) October Report Missing

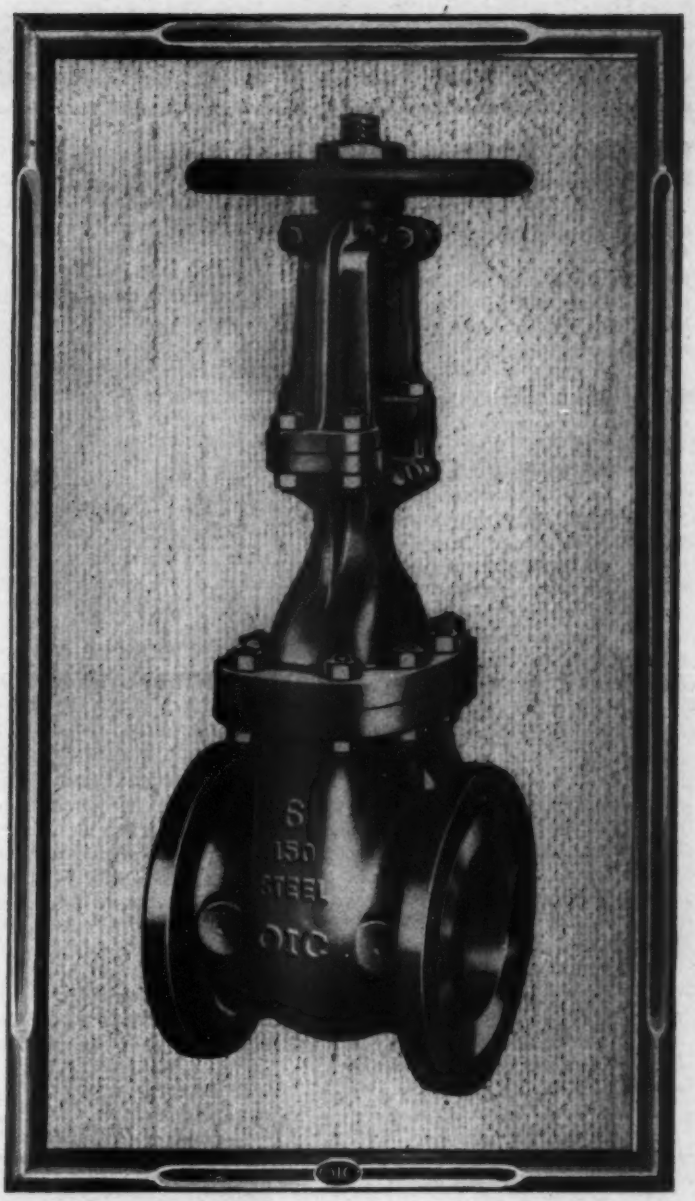
The paper industry safety contest is conducted among member mills of the Paper and Pulp Section of the National Safety Council, and runs for twelve months. The present contest covers the period July 1, 1943, to June 30, 1944.

Look to

OIC

for

STEEL VALVES



For today's critical needs and for tomorrow's planning, look to OIC for CAST STEEL VALVES — worthy additions to the 60-year old line of famous, sturdy OIC Bronze and Iron Valves.

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ASSOCIATIONS

CHICAGO PROFESSIONAL PAPER GROUP ORGANIZED

The first meeting of a group tentatively designated as the "Chicago Professional Paper Group," was held at the Medinah Club, Chicago the evening of December 6. About 100 persons interested in the broad subject of paper were present.

Walter Daley, sales manager of Watab Paper Company, was general chairman of the meeting. In his opening remarks, Mr. Daley explained the purpose of the organization—that it is to provide a common meeting ground where paper and printing men may gather and exchange ideas, also listen to speakers on subjects of common interest. He also suggested the probability of varying the programs to include plant visitations. Mr. Daley continued that it is the plan of the organization to bring together the executive, the salesman, the converter, the printer, the manufacturer, and, if possible, the consumer. He also stated that when the proper time comes, formal request will be made to the Technical Association of the Pulp and Paper Industry to accept the group as a member of the national body.

The organization not having any permanent officers, Mr. Daley appointed the following nominating committee, which will present a slate of officers at the next regular meeting of the organization on January 10, 1944: Harry E. Weston (chairman), R. A. Diehm, Major James d'A. Clark, and Walter Bain.

S. H. Ross, authority on printing inks and their applications, was the principal speaker of the evening. His subject was "Highlights on Manufacture and Use of Lithographic Inks." Quoting from the speaker's remarks:

"Lithographic inks are more complex than type inks. The pigments must be inert to water and the vehicle construction is more complicated, using a wide variety of oils (largely drying oils), and gums (both natural and synthetic), and with various so-called compounds and dryers added.

"In quantity production, the size of the individual batch of lithographic ink may vary from 100 to 500 lbs. In the case of lead or chrome yellow, the pigments are approximately two-thirds, and the vehicle one-third. With organic yellows, reds and blues, the pigment vehicle ratio is 50-50. Blacks are at the top with respect to vehicle requirement, that is, one-third pigment, and two-thirds vehicle.

"It is a prerequisite of a litho ink that it should not mix with water, but it must be receptive or 'take water' to a limited extent."

Mr. Ross stressed the need for sharing knowledge. He mentioned that the ink manufacturer and the printer must learn more about paper while the paper manufacturer must learn more about ink and its application to paper. Mr. Ross is associated with the Newman-Rudolph Lithographing Company of Chicago.

Remarks pertaining to the scope and place of the new organization were made by George Gibson of Mosinee Paper Mills, and also by Major James d'A. Clark of the U. S. Quartermaster Depot, Chicago

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D. C. EVEREST TO RECEIVE TAPPI MEDAL

The 1944 medal of the Technical Association of the Pulp nad Paper Industry will be presented to David Clark Everest, president and general manager of the Marathon Paper Mills Company, Rothschild, Wisconsin.

The medal was unanimously awarded to Mr. Everest by the TAPPI Executive Committee and is given to an individual for making outstanding contributions to the technical advancement of the pulp and paper industry.

Mr. Everest was born at Pine Grove, Michigan, October 13, 1883. He entered the employ of the Bryan Paper Company, Kalamazoo, Michigan, as a clerk in January, 1900, and was assistant manager of the Munising Paper Company, Munising, Michigan, from 1902-1907. He was manager of the Williams-Gray Company, Chicago, from 1907-1909. On March 1, 1909, he went to Wausau, Wisconsin, as manager of the newly organized Marathon Paper Mills Company where he had charge of the construction of the Marathon plant at Rothschild, Wisconsin.

D. C. Everest

He has been connected with the organization of several paper companies and a number of other manufacturing companies, including the Masonite Corporation at Laurel, Mississippi.

He was twice president of the American Paper and Pulp Association and was one of the organizers of the Institute of Paper Chemistry at Appleton, Wisconsin; he has been a trustee and officer since its inception. From September, 1940, to October, 1941, he was chief consultant to the Pulp and Paper Branch of the Office of Production Management, forerunner of the War Production Board; he has been interested in the Technical Association of the Pulp and Paper Industry since its organization in 1914 and has served as a member of its executive committee.

The medal award will be made at the annual luncheon of the Technical Association of the Pulp and Paper Industry to be held at the Commodore Hotel, New York City, on Thursday, February 17, 1944. The presentation address will be made by Allen Abrams, now with the Office of Strategic Services in Washington, D. C.

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▶▶▶ FIFTY MEMBERS AND GUESTS attended the meeting of the Western Maryland Section of the American Chemical Society at the Algonquin Hotel, Cumberland, Maryland, November 12. Dr. Donald Price, technical director, organic research laboratory, National Oil Products Company, Harrison, New Jersey, addressed the meeting on the subject "The Chemistry of Surface Active Agents." Dr. R. W. Work, of the Celanese Corporation of America, chairman of the Section, presided.

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ANNUAL MEETING OF THE NAT'L PAPERBOARD ASS'N

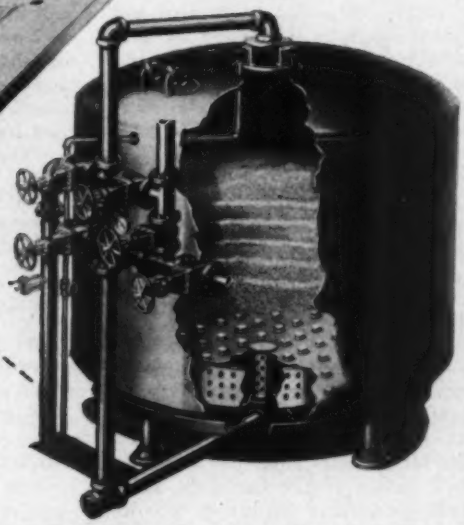
The annual meeting of the National Paperboard Association was held at the Waldorf-Astoria Hotel, New York City, November 18-19, with 89.7 per cent of the tonnage of Association membership represented.

The following officers were elected to serve the Association for the ensuing year:

President—W. Irving Osborne, Jr.,

DESIGN

for post-war progress



Graver Water Filters, either vertical or horizontal, can be built in any capacity to meet your requirements. Prominent among the many features is the under-drain collecting and distributing system which insures uniform pressure over the entire area, resulting in equal collection from, and uniform distribution to, the entire filter bed.

ASIDE from winning the war, laying plans to meet the demands of a peacetime world is one of industry's most important activities today.

Here at Graver we are working closely with the management and engineering staffs of many of America's leading industries. Our big job is to supply essential equipment to those producing munitions of war, and we're working at it night and day. But our drawing boards also reveal plans for water conditioning equipment of all types to meet the requirements of peacetime. This equipment will not be built until Victory is won. Yet the planning will be completed. And when the last shot has been fired, there need be no delay in getting into production.

It's none too early to start planning, and our engineers will gladly cooperate with you. This service does not obligate you in any way and it may save you valuable time when the day arrives for rapid conversion to peacetime production.

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Graver designs, builds and installs all types of water conditioning equipment including:

Water Filters • Oil Removal Filters • Iron Removal Filters
Hot Process Water Softeners • Zeolite Water Softeners
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ET-46W

president Cornell Wood Products Co., Chicago; *Vice President* — Jos. S. Miller, president New Haven Pulp & Board Co., New Haven, Conn.; *Executive Manager*—Frederick G. Becker, New York City and Chicago; *Secretary-treasurer*—H. S. Adler, Chicago.

At the first session of the meeting, G. G. Otto, director of the Paperboard Division of the WPB's newly organized Forest Products Bureau, reviewed developments at Washington which led to the creation of the Paperboard Division. He brought out that during August, of this year, the Government became aware of the extreme importance of paperboard and paperboard containers. He also outlined the functioning of the Paperboard Division, including the sub-divisions which will be in charge of paperboard, containers, folding boxes, and setup boxes. He also described the progress made to date in the appointment of Advisory Committees. Mr. Otto stated that men of experience in the paperboard and related industries are needed for service with the WPB at Washington, and he appealed to those present to make whatever sacrifice is necessary in order that men of the proper qualifications may be in position to accept their appointments for service at Washington. The speaker also touched on the coordination of government and industry resources in support of the waste paper campaign.

Three years ago a program was started whereby used paperboard mill felts were made into blankets and shipped overseas under an arrangement originally made with The Maple Leaf Fund, Inc. At the close of October, 1943, there has been shipped to the Maple Leaf Fund, Inc. (which is now known as The Canadian, Maple Leaf, Division of the British War Relief Society) a total of 203,755 blankets.

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▶▶▶ OFFICERS WERE RE-ELECTED at the annual meeting of the Packaging Institute, held November 4-5 at the Hotel New Yorker, New York City. At this meeting, it was decided to hold the Institute's semi-annual meeting March 29, 1944, at the Palmer House, Chicago.

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PUBLIC RELATIONS PROGRAM FOR THE PAPER INDUSTRY

The Salesmen's Association has been appointed by the American Paper and Pulp Association to survey the question of a Public Relations program for the Pulp and Paper Industry of the United States. Norman T. Beardsley, president of the Salesmen's Association and chairman of the Public Relations Committee, reports that considerable progress has been made and in the immediate future a tentative program for approval of the American Paper and Pulp Association will be presented.

"We need a Public Relations Campaign in the Pulp and Paper Industry," Mr. Beardsley states, "because this industry does not realize its collective power and importance in the national economy. Furthermore, the general public does not realize the importance of the Paper Industry to its every day existence. Fortunately, the general public's attitude toward the pulp and paper industry is not unfavorable, it is just apathetic—the man in the street accepts paper as he does the air he breathes and the water he drinks.

"The purpose of this Public Relations Campaign is merely to project our industry to the public and explain to them how vital paper is to them in their every day life so that the pulp and paper industry will have the public's interest and sympathy to assist us in solving the problems we face today and the even more pressing problems which are sure to confront us in the post-war period.

"The reasons why we should have a Public Relations Campaign now are apparent. Such a Public Relations Campaign requires a great deal of study and groundwork, and the campaign must be under way for some time before the effects become apparent. Therefore, a Public Relations Campaign should be regarded in the same way as fire prevention methods—you have to have a fire department to put out a fire before a fire starts. If you waited for the fire to start before organizing a fire department, your house would most certainly burn down.

"Public Relations has been defined as follows: The one fundamental purpose of a Public Relations program is the creation of a favorable opinion of a business, an industry, a government, or any institution which needs the good will of the public.

"This Public Relations Committee has worked diligently and hard and has covered every possible angle. Certain conclusions have been reached and a program is now ready to be presented to the American Paper and Pulp Association. If this meets with the approval of the American Paper and Pulp Association and the Industry, a Public Relations Campaign for the Paper Industry of the United States can be started in the early part of 1944."

THE PULP AND PAPER INDUSTRY— THE CURRENCY OF CIVILIZATION*

PAUL KELLOGG, Acting President Newsprint Association of Canada

▶▶▶ Canada's pulp and paper industry will be the backbone of her postwar trade and promises to earn cash abroad and create employment at home while other industries are cultivating new markets.

Postwar Canada must plan, diversify and develop industries and resources. But while we are doing these things, which admittedly will take time and will be accompanied by many failures, what is the country going to do for money? It could borrow, continue ruinously high taxation, or develop the export trade of prewar days.

Of the highest importance to the country's postwar economy would be industries capable of reviving and developing their export markets; above all, of being able to sell for cash. The largest markets for the export sale of pulp and paper are the United States, the British Empire and South America. The United States is by far the largest. These markets will be cash markets—if any are.

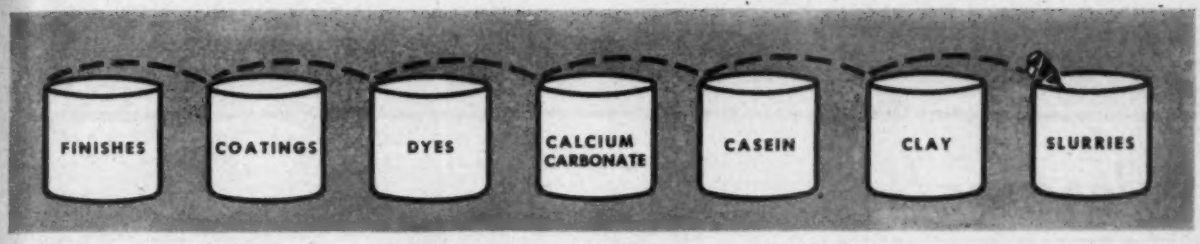
In prewar exports, pulp and paper had been among leaders. In 1939, monetary gold had earned about $184,000,000 abroad, pulp and paper about $150,000,000 and wheat about $109,000,000. But the Dominion Bureau of Statistics had stated that, in the depression period 1930-35, newsprint alone had brought into Canada foreign exchange totalling $563,000,000 compared with $475,000,000 from gold and $130,000,000 from nickel. In the immediate postwar period, the position which gold would occupy would yet have to be fixed. As for wheat we can give it away but can we sell it?

Canada is fortunate in having pulp and paper as its greatest manufacturing industry. Four reasons are:

1) The products of the industry are highly essential and widely diversified. In the depression of the early thirties, when some major industries, such as steel, were operating at less than 20 per cent of capacity, the pulp and paper industry certainly never went below 40 per cent.

2) There is a high probability of the industry's permanence. Pulp or paper, as it is now manufactured almost altogether from wood, represents the cheapest form in which cellulose can be made serviceable and there is as yet no known product which is

(*) A condensation of address given by Mr. Kellogg before the Canadian Club of Toronto, Canada.



Carry them from job to job

OR MOUNT ON SINGLE TANK FOR 24 HOUR PRODUCTION PRODUCTION LINE

Whether your mixing requirements call for a permanent installation or a utility unit that can be used for odd mixing jobs, "LIGHTNIN" Portable Mixers, are faster and more economical.

Portable, easily moved from one container to another, and readily adjustable to any desired angle, geared and direct drive "LIGHTNIN" Portables range in size from 1/8 to 5 H. P. to meet countless operating conditions.

"LIGHTNIN" Mixers are available with either electric or air driven motors. *For complete details, write for Bulletins B-75 and B-69.*

MIXING EQUIPMENT COMPANY, INC.

1035 GARSON AVE., ROCHESTER 9, N. Y.

cheaper than wood cellulose, or as versatile, which is capable of being processed simply and cheaply. . . . Furthermore, because only the Soviet Union and Brazil exceed Canada in forest resources, Canada has an excellent chance of holding on to the industry provided we are all alive to the necessity of doing so.

3) It is still a young industry. In its development it has two main roads to travel. Pulp and paper may form a cheap base for direct chemical processing into other products—dissolving pulps that become gun cotton, rayon, cellophane, etc. Or pulp and paper may itself be processed mechanically or combined with some other product —roofings, imitation leather, hospital wadding, building board, etc.

4) In its operations, the pulp and paper industry reaches a large number of other Canadian industries and employs many workers in widely scattered communities. The industry spends $60,000,000 a year on transportation. Forty per cent of all power consumed in Canadian manufacturing is used by pulp and paper mills. To a great degree, the industry is a country industry. Whole farming sections of Quebec and Ontario supply about almost their entire crops to pulpwood logging camps. In pulp and paper mills are employed more people than in any other industry except sawmills; and if labor in the woods were counted, around 160,000 men would be working on pulp and paper at peak periods. Finally, some 50,000 Canadians are directly dependent upon the pulp and paper industry.

Nevertheless Canada's pulp and paper industry finds one of its principal sources of trouble in the fact that it is a big exporter. It has to depend for its very existence upon tariffs and other governmental policies over which it has no control. It has to compete in export markets with products from low-wage countries, subsidized into the bargain. Canada holds her export market in pulp and paper only because of her reputation for quality, reliability and service. That was one of the reasons why the industry at this time was striving to obtain all the woods labour necessary for a winter's pulpwood cut which would insure maintained output.

CONVENTIONS AND COMING EVENTS

Feb. 14-17—Paper Week. Annual meeting of the American Paper and Pulp Ass'n, at the Waldorf-Astoria Hotel, New York City.

Feb. 14-17—Annual meeting of the Technical Association of the Pulp and Paper Industry, at the Commodore Hotel, New York City.

STATED MEETINGS

Technical Association of the Pulp and Paper Industry

Delaware Valley Section—First Friday of each month at the Engineers' Club, Philadelphia, Pa.

Kalamazoo Valley Section—First Thursday of each month, including June, at 6:30 P. M. at the Columbia Hotel, Kalamazoo, Mich.

Lakes States Section—Second Tuesday of each month at the Conway Hotel, Appleton, Wis.

New England Section—Third Friday of each month at the Roger Smith Hotel, Holyoke, Mass.

NAMES *in the* NEWS

Personals

HAROLD BEADLE NOW S. M. OF NEW PRODUCTS AT NAUGATUCK CHEM.

Widely known as a chemical engineer, Harold I. Beadle has been appointed sales manager for new products of Naugatuck Chemical Division, U. S. Rubber Company. In this capac-

Harold I. Beadle

ity, Mr. Beadle will handle sales of new synthetic rubbers and synthetic plastics for the rubber company and also new developments for the company in other chemical fields being explored by the company.

Mr. Beadle is a graduate of M.I.T. and practiced as a consulting engineer in New York City for six years, during which he did considerable research and development in cellulose derivatives and compounds. After that he was connected with the Tide Water Associated Oil Company.

In addition to sales activities in connection with his new assignment, Mr. Beadle has been appointed a member of the new products committee responsible for the investigation and evaluation of new products.

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▶▶▶ The Philadelphia Quartz Company, Philadelphia, announces that it has added to its sales development staff, *Harold R. Hay,* formerly with the Northern Regional Research Laboratory, Peoria, Illinois, where the U. S. Department of Agriculture carries on experimental work. Mr. Hay is a graduate chemist from University of Wisconsin, with postgraduate research at the Forest Products Laboratory, Madison, Wisconsin. He will have his headquarters at the company's Philadelphia offices.

◆

WILBUR ARMACOST NOW VICE PRESIDENT OF COMBUSTION ENG. CO.

The Combustion Engineering Company, Inc., New York, announces the election of Wilbur H. Armacost as vice president to succeed the late F. H. Rosencrants in charge of marine activities of the company. Mr. Armacost also will continue to supervise the design of industrial superheaters and economizers, as well as forced-circulation boilers, and will be responsible for the chemical recovery units and VU type steam generators.

Mr. Armacost is a graduate in mechanical engineering of Armour Institute of Technology. He served as an officer in World War I and has had wide experience in the power field. He has been associated with Combustion Engineering since it was merged with The Superheater Company; he had been connected with the latter company since 1920.

Mr. Armacost is an active member of the A.S.M.E., and is connected with a number of engineering bodies.

Wilbur Armacost

▶▶▶ Since 1939, *Milton J. Maguire* has been assistant manager of the Paper Makers Chemical Division of Hercules Powder Company, Holyoke, Massachusetts. The Hercules Powder Company

Milton J. Maguire

now announces the appointment of Mr. Maguire as resident manager of the company's Portland, Oregon, office. He will have *J. V. B. Cox* as assistant manager.

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▶▶▶ The Controllers Institute of America has elected to membership *John E. Cowles,* assistant treasurer of the Maine Seaboard Paper Company, Buckport, Maine, and *Frank E. Defren,* controller of the Hudson Pulp & Paper Corporation, New York City. The Institute is a technical and professional organization of controllers devoted to improvement of controllership procedure.

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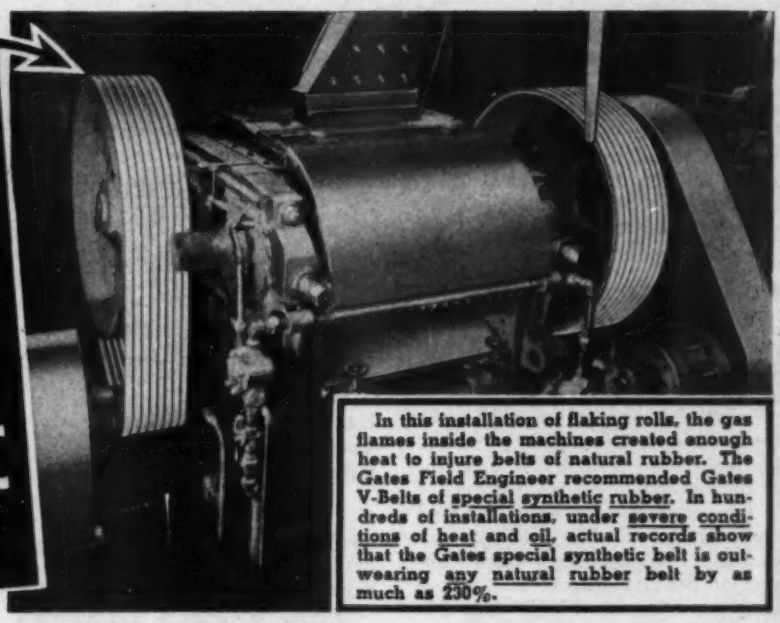
LOGGING EXPERT MAY RETURN FROM ARMY TO PAPER INSTITUTE

Before going overseas with the Canadian Forestry Corps, G. F. Randolph temporarily assisted in the study by the Woodlands Section and the Pulp and Paper Research Institute on efficiency of technic in pulpwood skidding. Very recently he returned to Canada—as a Lieutenant—after going through good experience in Scotland in logging for the Army needs.

Should Mr. Randolph be released from the Army, he will join the staff

Here The Gates Field Engineer Recommended

GATES BELTS of Special SYNTHETIC RUBBER



In this installation of flaking rolls, the gas flames inside the machines created enough heat to injure belts of natural rubber. The Gates Field Engineer recommended Gates V-Belts of special synthetic rubber. In hundreds of installations, under severe conditions of heat and oil, actual records show that the Gates special synthetic belt is outwearing any natural rubber belt by as much as 230%.

He Can Tell You Whether You Need . . . .

❶ Synthetic Rubber V-Belts

❷ Steel Cable V-Belts

❸ Cotton Cord V-Belts

❹ Static-Safety V-Belts

❺ Rayon Cord V-Belts

Whenever a drive in your plant appears to be wearing belts out faster than it should—just pick up your phone and call the Gates Field Engineer.

He is a specialist in drive operation and he can quickly diagnose any trouble you are having. In most cases he can correct that trouble very easily and without recourse to using V-Belts of special structure.

There are, however, countless drives where V-Belts having special characteristics will prove to be the most efficient and economical that you can use.

The flaking rolls, pictured above, are a case in point. For more than five years now, Gates has been making special synthetic V-Belts—and the records in hundreds of applications show that, under severe conditions of heat and oil, these special synthetic belts are wearing 2 times to 2½ times as long as any belt of natural rubber.

There are other types of drives on which V-Belts with load-carrying members composed of flexible steel cables — or of rayon cords — will prove to be the most desirable application. Again, a Static-Safety V-Belt may best fit your special needs.

In any case, the wisest move you can make is to phone your Gates Field Engineer. Your telephone directory will give you his number. He will put all of his specialized knowledge and experience at your disposal—and he will always recommend the practice that will be most efficient and economical for you.

4312.

THE GATES RUBBER COMPANY

Engineering Offices and Stocks in All Large Industrial Centers

GATES VULCO ROPE DRIVES

CHICAGO, ILL. 549 West Washington

NEW YORK CITY 215-219 Fourth Avenue

ATLANTA, GA. 738 C. & S. National Bank Building

LOS ANGELES, CAL. 2240 East Washington Boulevard

DENVER, COLO. 999 South Broadway

DALLAS, TEXAS 2213 Griffin Street

PORTLAND, ORE. 333 N. W. 5th Avenue

SAN FRANCISCO, CAL. 1090 Bryant Street

of the Woodlands Section, temporarily at least in the capacity of its logging efficiency instructor. In that case, he will assist such companies in the membership of the Canadian Pulp and Paper Association as wish his service in the solution of the problem of instruction of woods labor to promote efficiency and safety in logging.

◆

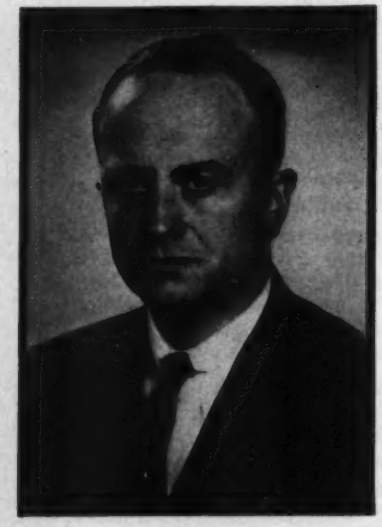
NORTON CO. PROMOTIONS

William R. Moore, general sales manager of the Abrasive Division, Norton Company, Worcester, Massachusetts, has been made a vice president. He has long been identified with the activities of Grinding Wheel Manufacturers Association and is a director of the Abrasive Grain Association.

The company also has announced the promotion of Ralph M. Johnson to the position of general sales manager of grinding wheels and abrasive grain for the entire United States. He was their western sales manager since 1939.

◆

▶▶▶ The Calco Chemical Division, American Cyanamid Company, Bound Brook, New Jersey, has announced the promotion of *Robert Collyer* to the



Robert Collyer

position of advertising manager. Mr. Collyer has been active in direct mail advertising and in the printing trade in New York City.

◆

▶▶▶ Vice president and general manager of the E. B. Eddy Company, Ltd., Hull, Quebec, is the new title of *W. S. Kidd*. A graduate in engineering of the University of Toronto, and a veteran of World War I, Mr. Kidd entered the employ of the Eddy company seventeen years ago as assistant chief engineer. Since that time, he has been successively chief engineer, production manager, and, since 1938, general manager. He was chairman of the Technical Section of the Canadian Pulp and Paper Association in 1935.

◆

▶▶▶ An announcement from H. G. Weber & Company, Kiel, Wisconsin, states that *H. H. Weber* will succeed his late father, H. G. Weber, as general manager of the company. He has been associated with his father in the business since 1936, previous to which time he was associated with the Thomas M. Royal & Company for eight years.

◆

▶▶▶ Price Bros. & Company, Ltd., has transferred *N. F. McCaghey* from Riverbend to Kenogami (both in Quebec) where he is now superintendent of properties and welfare. He has been with the company since his return from overseas in 1919.

Necrology

PAUL HODGES

Paul Hodges, production manager of the Crossett Paper Mills, Crossett, Arkansas, passed away suddenly November 19 at Cincinnati, Ohio. He was 37 years of age.

Mr. Hodges was widely known in the industry. He had been associated with Gulf States Paper Corporation, Tuscaloosa, Alabama; Scott Paper Company, Chester, Pennsylvania; and before going to Crossett he was technical director for the Brunswick Pulp and Paper Company, Brunswick, Georgia. He was a member of the Technical Association of the Pulp and Paper Industry.

He is survived by his widow and two sons.

◆

E. E. BERRY

Vice president of Beloit Iron Works, Beloit, Wisconsin, and a director of the War Production Board, E. E. Berry passed away in Beloit November 9. He was 52 years of age.

Mr. Berry had been associated with the Beloit Iron Works since 1921, and his record as an engineer gave him an important part in the development of papermaking machinery. He had been vice president in charge of engineering for the Beloit company since 1930. He had been on leave from his duties at

E. E. Berry

Beloit to serve on the War Production Board.

Mr. Berry was a member of the Technical Association of the Pulp and Paper Industry and the American Society of Mechanical Engineers. He is survived by his widow.

◆

LOUIS F. H. KOEHN, SR.

A resident of Nekoosa, Wisconsin, for 41 years, during all of which time he was employed at Nekoosa-Edwards Paper Company, Louis F. H. Koehn, Sr., passed away November 17 at the age of 69 years.

When he first was employed by the company in 1902, Mr. Koehn served as foreman in the hydroelectric plant. He held the same job during the 41 years until he became inactive a few months ago. He had also served as chief of the Nepco fire department. Mr. Koehn was born in Germany.

The widow and five children survive.

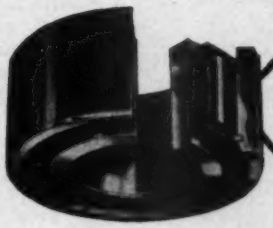
◆

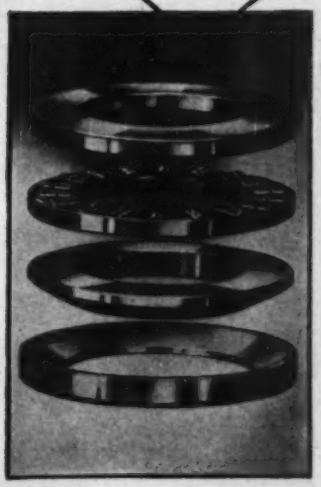
EDGAR V. O'DANIEL

At the age of 59, Edgar V. O'Daniel, vice president and a director of the American Cyanamid Company, passed away November 4. Mr. O'Daniel also headed the North American Cyanamid, Ltd., Canadian subsidiary of American Cyanamid, and was a director of the Chamber of Commerce of the United States, serving as chairman of that organization's committee on economic policy.

Mr. O'Daniel entered the chemical industry in 1918 as treasurer of Air Nitrates Corporation. In 1920, he became vice president and general manager of National Carbide Corporation, and in 1923, he was made vice president of American Cyanamid. He was

Maintenance will be DOUBLY IMPORTANT after the war...





Look into this RIGHT-ANGLE BEARING LOADING *now*...

The hours spent on maintenance, the production lost through repair shutdowns, bulk large in management thinking today. Tomorrow, when operating costs spell either competitive advantage or handicap, control of maintenance time and cost will be *doubly* important. That's why Rollway's Right-Angle Bearing Loading may be the decisive factor in your sales results.

No Compound Loads
No Oblique Loads

- **ALL thrust loads are carried at right angles to the roller axis.**
- **ALL radial loads are carried at right angles to the roller axis.**

Right-Angle Bearing Loading Cut Maintenance Time & Cost

When load magnitudes are large . . . when thrust forces are continuous, intermittent or reciprocal . . . Rollway's Right-Angle Bearing Loading definitely improves bearing life and reduces maintenance cost:

1. by splitting the load into its two simplest components of pure radial and pure thrust.
2. by carrying each of these components on separate bearing assemblies, thereby reducing the magnitude of load per bearing.
3. by eliminating all compound loads, all oblique loads and their resultants.
4. by using the full strength of a *complete roller assembly* to meet the stresses of thrust loads.

★ **DON'T WAIT** until the urgency of postwar reconversion and redesign are crowding you. Investigate Right-Angle Bearing Loading now. Send us sketches or drawings for free bearing analysis and recommendation today. Or ask for a Rollway catalog, showing hundreds of series in S.A.E., or American Standard metric dimensions and tolerances.

ROLLWAY BEARING COMPANY, INC., SYRACUSE, NEW YORK

BUILDING HEAVY-DUTY BEARINGS SINCE 1908 **BEARINGS**

a member of the National Industrial Conference Board and a director of the Commerce and Industry Association of New York. Through these groups and the U. S. Chamber, he had been promoting plans for a continued high level of production in the postwar period. He served as a member of President William Howard Taft's commission on efficiency and economy in 1912 and 1913. He was connected with a large number of business groups and clubs.

Surviving besides the widow are two daughters and a son, Lieut. Richard Edgar O'Daniel, USNR.

GEORGE E. SENSENEY

A colorful career which began in the field of art in paper design terminated with the passing of George E. Senseney, president of the Marvellum Company, Holyoke, Massachusetts.

In 1919, Mr. Senseney was prevailed upon to leave a professorship of design at Smith College to enter the field of industrial paper design, then in its infancy. From 1919, through 1921, he was a director of the American Writing Paper Company, but in 1921, he joined with Francis C. Heywood, of Holyoke, and a group of paper converters, in the formation of the Marvellum Company. He was elected president at that time and has remained in that office.

George E. Senseney

Mr. Senseney was born at Wheeling, West Virginia, October 11, 1884. He studied art in Washington, D. C., and in Paris where he was married. After returning to the States he taught etching in New York City and later organized the New School of Art, in Chicago. Some of his etchings hang in the Library of Congress, the Public Library, New York City, and the South Kensington Museum in London. Many of the newest designs and papeterie novelties developed by the Marvellum Company are of his creation. He is listed in *Who's Who in America.*

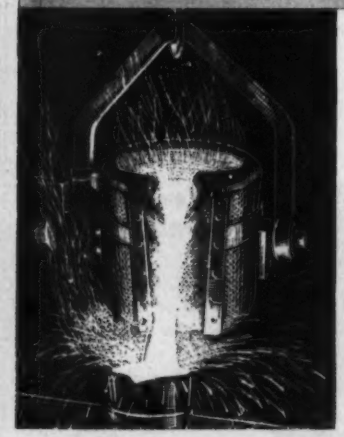
◆

▶▶▶ Head of the International Pulp Company, New York, for the past forty years, *Michael Doyle* passed away November 26 at the age of 81 years. He was born in Ireland and settled in Rochester, New York, when coming to America as a youth. Besides heading the International company, Mr. Doyle also was president of the U. S. Talc Company and the Union Talc Company. He was one of the founders of the Rochester Chamber of Commerce and served as its president in 1904.

◆

▶▶▶ Formerly sales manager of the Collins Manufacturing Company, North Wilbraham, Massachusetts, *Elisha C. Walker* passed away October 28 in Canton, North Carolina. Mr. Walker was born in England and came to Holyoke while a youth. Before becoming associated with Collins Manufacturing Company, he worked as a salesman for the American Writing Paper Company. He leaves a son.

DENSICAST



STAINLESS-STEEL CASTINGS WITH INCREASED CORROSION RESISTANCE

DENSICAST—the new Cooper idea for casting 18-8 stainless steel and other high-chrome alloys—provides: Refined grain structure, greater elongation and reduction of area and frequently higher tensile strength, as well as increased corrosion resistance.

If you are interested in stainless steels with characteristics such as these, write for complete information. We shall be glad to discuss your casting problems with you and give you the benefit of our experience in the development of new alloys and new methods of producing corrosion, heat and abrasion resisting castings. You will not be obligated in any way.

THE *Only* ALLOY FOUNDRY WITH *All* THESE FACILITIES

- Laboratory control over raw materials and finished products.
- Dual foundry . . . both hand and machine molding.
- Centrifugally-cast castings.
- Heat treating of castings up to six feet in size.
- Machine shop . . . specially equipped for finishing stainless steel.
- Improved cleaning . . . including Lustra-cast electrolytic finishing which leaves all surfaces bright.
- Castings furnished rough, polished or fully machined . . . one ounce to two tons.
- X-ray and Gamma-ray inspection.
- Development of special alloys to meet unusual requirements.
- Technical consulting service.

THE *Cooper* ALLOY FOUNDRY CO.
125 BLOY STREET • HILLSIDE, NEW JERSEY

Hamiltonnage

The capacity of a ship is measured by the tonnage it carries in its hold. That of a paper machine, by the tonnage it carries on its felt. A ship's cargo may be either wet or dry.

That of a paper machine must be uniformly dry. Otherwise the sheet will break.

Hamilton Felts remove water *uniformly*. They reduce broke and increase tonnage. They also reduce the load on the driers, with corresponding economy of fuel. Properly installed, Hamilton Felts stand up longer under higher speeds and thereby deliver more tonnage per hour of operation. HAMILtonnage.

★ *From the thinnest tissue to the heaviest board, there is a Hamilton Felt that will do your work better, faster and at lower cost.*

SHULER & BENNINGHOFEN, HAMILTON, OHIO

Miami Woolen Mills

Hamilton Felts

Established 1858

Here's how to make your present Valves ...LAST LONGER ...SERVE BETTER

"N-M-D"
(NON-METALLIC DISC)
GLOBE VALVE

Disc can be renewed in a jiffy. Simply unscrew locknut from disc holder, remove old disc, insert new one and reassemble. Or better still, keep on hand some spare disc holders complete with discs—slip a disc holder and a new disc on the stem and remove the old disc later.

● Experience shows that even the best valves last longer and serve better if given periodic inspection ... and repairs when necessary.

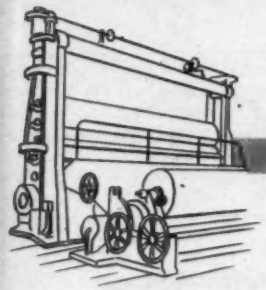
Today when new valves and even repair parts are scarce and require high priorities, it is more essential than ever to take good care of the valves you now have in service.

The Lunkenheimer "N-M-D" Valve illustrated is typical of the simple, rugged, easy-to-maintain construction that distinguishes Lunkenheimer design practice.

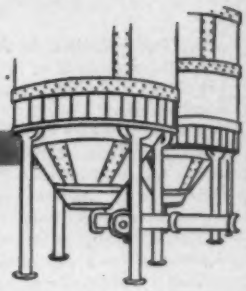
Thus maintenance men working with these valves find them easier to keep fit and on the job.. find that Lunkenheimer valves will last longer and serve better with less time out for repairs.

Use the facilities of Lunkenheimer distributors. They'll help you get what you need.

BRONZE, IRON, STEEL AND CORROSION RESISTANT ALLOY VALVES, 125 TO 2500 LB. S.P.; BOILER MOUNTINGS, LUBRICATING DEVICES, AIRCRAFT FITTINGS. ASK FOR CATALOG 78



Practical SHORTS



Readers are invited to submit short, practical articles for this department. The items should be original and should relate to ways and means of handling production and maintenance jobs. Where possible, articles should be illustrated. Rough sketches only are required. Payment will be made for acceptable items upon publication.

Winter Protection for Fire Extinguishers

Several common types of fire extinguishers are subject to freezing and, if allowed to do so, may be rendered inoperative or even dangerous to use.

Soda-acid, foam and gas cartridge extinguishers must be kept in relatively warm locations (above 40 Fahr. to be safe) or in suitably heated cabinets. The National Board of Fire Underwriters specifies that cabinets for use in sub-zero climates be of ⅞ inch, double-wall construction and be heated by a continuously burning incandescent lamp of not less than 50 watts. Single-wall enclosures, similarly heated, are suggested for locations where temperatures below zero Fahrenheit are not encountered.

Antifreeze chemicals, such as common salt, calcium chloride and glycerine, should not be added to extinguishers of these types, since foreign ingredients may reduce the effectiveness or change the nature of the discharge, or corrode the parts and make the extinguishers dangerous to use.

Pump tank and gas cartridge extinguishers can be protected by adding antifreeze chemicals supplied by the manufacturer. Chemicals other than these should not be used, however, as they may cause corrosion.

Extinguishers which do not require protection from freezing are the vaporizing liquid, carbon dioxide, and loaded stream types. The first two contain no water; the latter does contain water, but has chemicals added which depress the freezing point.

Since the sale of all Underwriters' Laboratories approved extinguishers is now subject to priority restrictions, careful maintenance, including protection against freezing and an annual inspection and recharge, is doubly important.—SAFETY RESEARCH INSTITUTE, INC.

◆

Locating Leaks or Stoppages in Concealed Piping

When a concealed pipe leaks steam, air, gas, oil, water, etc., here is a simple method to locate the leak.

Fill the pipe with water to overflowing. Close all valves which hold the water against gravity. Let stand for a number of hours, possibly over night, depending on the size of the leak and the rate at which the water level in the pipe drops. In other words, allow as much water to leak out as can leak out.

After a suitable interval, using a calibrated can, fill the pipe quickly with water but without allowing any overflow.

Note the exact amount of water poured into the pipe. Next, multiply the inside diameter of the pipe in inches by itself and the figure so obtained by 0.7854. Then divide the result into the number of cubic inches of water poured into the pipe (one U. S. gallon equals 231 cubic inches). The quotient is the distance to the trouble spot in inches.

The same method often may be used for calculating the point of stoppage in pipes which are stopped up.—W. F. SCHAPHORST, M. E.

◆

A Foreman's Qualifications

(1) *Knowledge of his own field.* A foreman must know thoroughly the work which he is supervising, if he is to secure the respect of his subordinates. Although he need not be as skillful in the use of all tools as his best workman, he should know the difference between the grades of work and how to produce acceptable work.

(2) To be successful, *a foreman must understand and be able to deal with people* —not only his workers but his boss as well. Both relationships will be smoother if the foreman has the ability to foresee the reactions of those with whom he comes in contact. Ability to sell himself and "knowing his way around" is important.

(3) If a foreman is to get co-operation, *he must be able to express himself.* He doesn't have to be a finished speaker, but he should be able to convey his meaning understandably, both to his workers and to his superintendent.

(4) *Honesty* should not be overlooked; and by this is meant *mental* honesty. He should not withhold credit when credit is due. Avoid all bluff; it is a form of dishonesty that cheats no one but the bluffer. Such tactics prevent the bluffer from ever gaining the knowledge, lack of which he hopes to conceal. A foreman should admit to himself his own deficiencies and then learn all he can about the subject. He'll then find less and less need for inclination to bluff.

(5) *Reliability* is a fundamental requirement. In work and word a foreman must be dependable in his relations with his boss and with his workers. Punctuality and ability to meet dates and schedules build an important part of a foreman's reputation. Promises are an equally important factor; they must be kept. Those based on good judgment are the easiest to keep.

(6) A *resourceful* foreman copes with conditions as he finds them, but he uses good judgment in limiting the use of his resourcefulness. He does not gamble with the safety of an employee or of material.

(7) Closely allied to resourcefulness is *initiative,* the quality that gets things started. With initiative, knowledge of his own field and the other essential qualities, a foreman can outstrip those who do not possess them.

(8) *Persistence* is the attribute that gets things done no matter what the obstacle. This stick-to-it-iveness which combines patience, hard work, curiosity and determination is a big asset to the foreman.

(9) *Enthusiasm* must exist in a leader and in a successful foreman. It may take various forms; to do a good job; to beat the schedule; to overcome a difficult problem; or it may be just the satisfaction of having a part in moulding a finished product out of a group of workers and raw materials.—*Foremanship and Accident Prevention in Industry,* AMERICAN MUTUAL LIABILITY INSURANCE CO.

◆

Care of Water Hose

1. Avoid bending, kinking, dragging over rough surfaces of any kind.

2. Do not kink to shut off flow of water. Always use valve or shut-off nozzle.

3. Whenever possible, supply a reel on which to wind the hose when not in use.

4. Store water hose in a protected place away from the sun and weather.

5. Drain water from hose when not in use to avoid penetration of water to the reinforcing cotton fabric.

6. Do not use at higher working pressures than recommended by the manufacturer.

7. When hose must be used under excessive pressures, avoid constant use. Periodic use for short periods will give longer life.

8. Connection to valve should be arranged so that hose hangs down. A constant bend near the coupling, with weight of hose putting tension on rubber, will seriously shorten hose life.—WILLIAM S. RICHARDSON, *Factory Management and Maintenance.*

◆

pH of Dyeing

Uniformity of shade and best results obtained from dyes depend to a considerable extent on the amount of alum used and the acidity of the tray waters. Most dyes will give optimum results at a tray water *p*H of 4.5 to 5.0, but many dyes show weakness at a higher *p*H. As examples: Soluble Prussian Blue and the acid oranges give optimum results at a *p*H of 4.5 to 4.7 and show weakness if run at a *p*H above 5.0. Most of the direct dyes work well at a *p*H up to 5.5 and sometimes 6.0 before showing weak-

ness. One basic dye, Methylene Blue, possesses the peculiarity of having an optimum *p*H of 6.5 and shows decided weakness at a low of *p*H.

Alum and acidity dulls and reddens many direct dyes. Two dyes which are extreme in this regard as Brilliant Violet B and Fast Heliotrope B. At a *p*H of 7.0, these dyes are bright red dish blues. With increasing acidity, they turn progressively redder and duller until at a *p*H of 4.4 they are dull reddish violets.

Purpurine 4B, Congo Red and Direct Orange R require a *p*H of 6.0 to 6.5 to produce the full brightness of the shade. Congo Red and Direct Orange R are very sensitive to acid and cannot be used at a low *p*H. Purpurine 4B is a yellowish red at *p*H 5.0 or below, and is sometimes used as an economical red in dull shades at a low *p*H.—JOHN R. ROBERTS, THE PAPER INDUSTRY AND PAPER WORLD.

◆

How to Tie Knots

The accompanying diagrams show how to tie various knots correctly. Data and diagrams by W. Elwood Rossnagel, Safety Engineer, Consolidated Edison Co. of N. Y., Inc.

1. *Principal parts of a knot*—These are the framework on which any knot is tied.

2. *Overhand*—Passing the end through the bight of Figure 1 produces this familiar knot.

3. *Square*—Perhaps most common of all is the square knot, used to join two ropes or cords. Note that the end and the standing part of the same rope lie together while the bight of the other rope passes either over or under both. This knot is safe and dependable if ropes are same size and dry, but even then rope strength is only about 50 per cent.

4. *Granny's*—This is a square knot tied improperly. Note that the bight does not go either over or under both parallel parts of the knot. This knot is unsafe and should never be used.

5. *Surgeon's*—In tying up a compressible bundle, such as overalls for instance, it is often difficult to keep the first half of the knot from slipping while the second half is being tied. Solution is the surgeon's knot, in which an extra turn is taken in the first half of a square knot.

6. *Sheet Bend*—Where wet ropes, or ropes of different sizes are to be joined, this knot proves more dependable than the square knot, but it will jam under strain and is consequently difficult to untie. The same knot, when used to join the cords in a net, is called a Weaver's Knot.

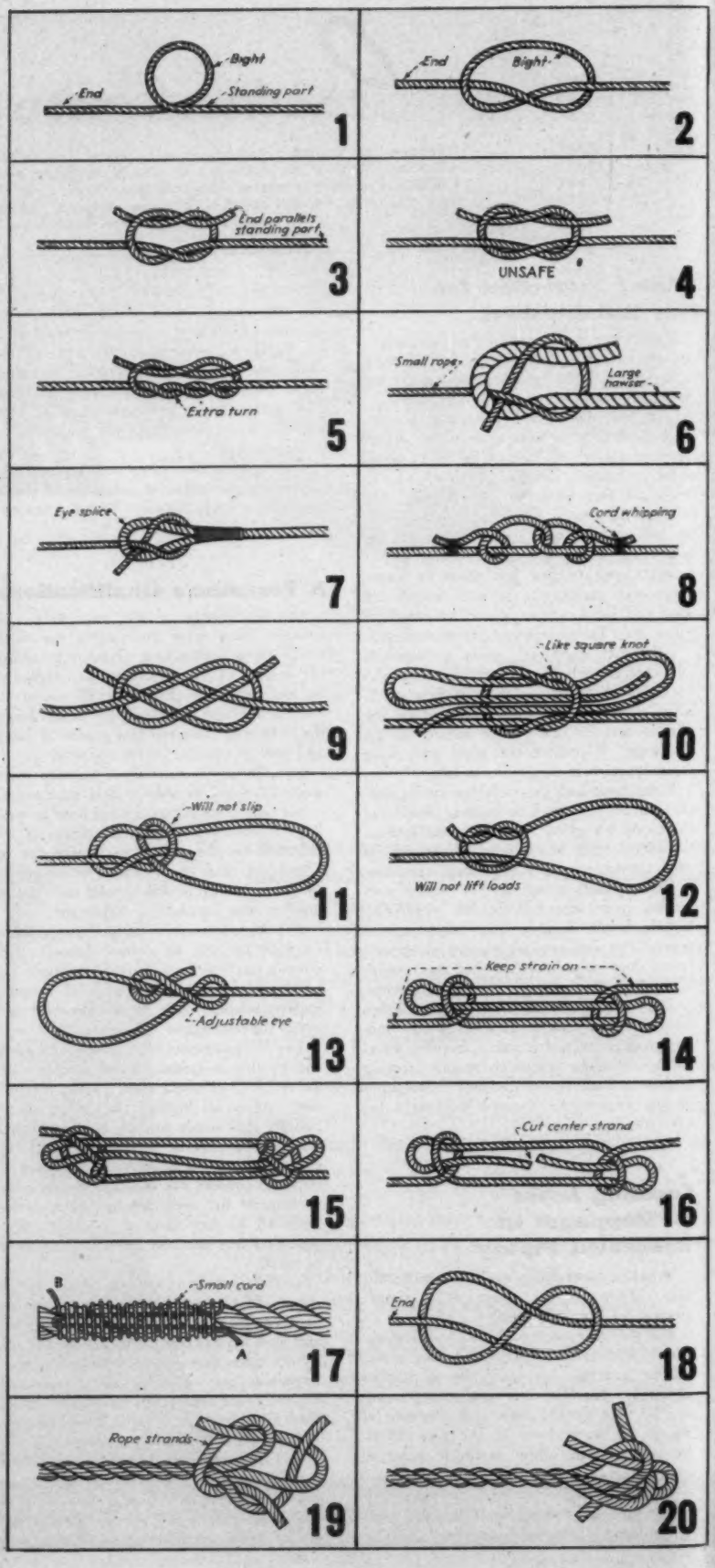
7. *Sheet Bend in Eye Splice*—When a small rope is used to reeve a larger rope or steel cable with eye splice through pulley blocks or sheaves, this adaptation of the sheet bend is used.

8. *Hawser Bend*—Prime application is for joining large hawsers. This knot is easily untied.

9. *Carrick Bend*—Same application as Figure 8.

10. *Double Bow*—As in the square knot, the bight must pass over or under all the parallel parts to be non-slip. Primary application is for joining small cords.

11. *Bowline*—The rigger's standby appears difficult but really is quite easy. First,



make a simple loop in the rope some distance from the end, then weave the end under and over the parts of the rope as you pass it through the loop, around the standing part, and back through the loop parallel with itself. This forms an eye that will not slip, yet which does not jam. It is readily untied after pressing backwards on the loop going around the standing part. Knot efficiency is about 60 per cent.

12. *Slip*—This knot, commonly used on small cords, is not dependable and should never be used to lift loads.

13. *Buntline*—This knot does the trick where an adjustable eye is required. If a running noose is needed, you can use a Bowline (Figure 11); pass the standing part of the rope through the eye.

14. *Sheepshank*—This knot, used to shorten a rope temporarily without cutting it, is very satisfactory provided strain is kept on the rope.

15. *Knotted Sheepshank*—Where strain is intermittent, this knot is more dependable than the one shown in Figure 14.

16. *Cut Sheepshank*—This knot is sometimes used by steeplejacks for getting down from the top of a newly built stack not equipped with a permanent ladder. After (and if) the jack gets down safely, he jerks the rope and rolls loop up in it until the Sheepshank comes apart and the rope falls to the ground, leaving only a foot of rope at the top. Note: This is not recommended as safe practice.

17. *Whipping*—This is the ideal way to prevent strands from untwisting or unlaying. First, a small cord or rope yarn is formed into an elongated "U" on the rope. Then, beginning at A, wind this cord tightly around the rope (the drawing shows the turns separated for clarity) until point B is reached. Then pass end B through the loop as shown, and finally pull end A until the interlocked loops are midway under the lashing. Complete the job by cutting off the two protruding ends of the cord.

18. *Figure 8*—Commonly used to secure the strands of a rope.

19. *Wall*—Use this knot to get a more permanent job than possible with Figure 18 and immediately on top of it put a Crown Knot, Figure 20.

20. *Crown*—This knot looks like it would take three hands but a little practice will change your mind.

NOTE: In bending a rope sharply, either around a small pipe, bar or ring, or around itself, individual fibers are strained and the net strength of the rope at such a bend is reduced by just that amount. In other words, every knot reduces rope strength, in some cases as much as 50 per cent.—*Power.*

◆

Marked Calender Rolls

If a machine is allowed to run with one marked [calender] roll while a spare is being ground, the rest of the stack will be injured, because the defective one will mark the rolls next to it and they, in turn, will injure the next. When one or more rolls plainly show dull and shiny streaks from end to end, it is wise to remove them at once and run the stack short of rolls if there are no spares available.

When rolls are reground, it is necessary to see that all chatter is eliminated, for if there is any chatter left in the roll, the adjacent rolls will become marked, and it will be only one or two weeks before all the rolls in the stack have chatter marks.

Ripples, which occur in wide stacks running at high speed, are another source of trouble, and if they are not removed in grinding, will reappear very soon after the rolls are again placed in the stack. Ripples on high-speed machines will appear again in due course because of the whipping action, but if they are removed when grinding, it will be a much longer time before these ripples reappear.

Some mills have a complete set of change rolls so that, when it is necessary to regrind the rolls in the stack, all rolls except the bottom one are removed and replaced with reground rolls. These mills have much better success in obtaining a good sheet of paper for a longer period of time than the mills that change only two rolls every week end.—*Booklet No. 114,* FARREL-BIRMINGHAM COMPANY, INC.

◆

Centrifugal Pump Troubles

Investigation shows that the majority of troubles with centrifugal pumps result from faulty conditions on the suction side. Except for mechanical trouble, nine times out of ten, this is where to look for the cause.

1. No water delivered.
   (a) Priming-casing and suction pipe not completely filled with liquid.
   *(b) Speed too low.
   (c) Discharge head too high—check vertical head (particularly friction loss).
   (d) Suction lift too high (suction pipe may be too small or long causing excessive friction loss). Handling cold water, total lift including friction loss in suction pipe should not exceed 15 feet, or in any case be more than 2/3 total head. Check with gauge.
   (e) Impeller or suction pipe or opening completely plugged up.
   (f) Wrong direction of rotation.
   (g) Air pocket in suction line.
   (h) Stuffing box packing worn—or water seal plugged—allowing leakage of air into pump casing.
   (i) Air leak in suction line.
   (j) Not enough suction head for hot water or volatile liquids. Check carefully as this is a frequent cause of trouble on such service.
2. Not enough water delivered.
   (a) Priming-casing and suction pipe not completely filled with liquid.
   *(b) Speed too low.
   (c) Discharge head higher than anticipated—check, particularly friction loss.
   (d) Suction lift too high (suction pipe may be too small or long causing excessive friction loss). Handling cold water, total lift including friction loss in suction pipe should not exceed 15 feet nor in any case be more than 2/3 total head. Check with gauge.
   (e) Impeller or suction pipe or opening partially plugged up.
   (f) Wrong direction of rotation.
   (g) Air pocket in suction line.
   (h) Stuffing box packing worn—or water seal plugged—allowing leakage of air into pump casing.
   (i) Air leak in suction line.
   (j) Not enough suction head for hot water or volatile liquids. Check carefully as this is a frequent cause of trouble on such service.
   (k) Foot valve too small.
   (l) Foot valve not immersed deep enough.
   (m) Mechanical defects:
      Wearing rings worn.
      Impeller damaged.
      Casing packing defective.
3. Not enough pressure.
   *(a) Speed too low.
   (b) Air in water.
   (c) Measure impeller diameter.
   (d) Mechanical defects:
      Wearing rings worn.
      Impeller damaged.
      Casing packing defective.
   (e) Wrong direction of rotation.
   (f) Be sure pressure gauge is in correct place. Not on top of casing.
4. Pump works for a while and then quits.
   (a) Leaky suction line.
   (b) Stuffing box packing worn—or water seal plugged—allowing leakage of air into pump casing.
   (c) Air pocket in suction line.
   (d) Not enough suction head for hot water or volatile liquids. Check carefully as this is a frequent cause of trouble on such service.
   (e) Air or gases in liquid.
   (f) Suction lift too high (suction pipe may be too small or long causing excessive friction loss). Handling cold water, total lift including friction loss in suction pipe should not exceed 15 feet nor in any case be more than 2/3 total head. Check with gauge.
5. Pump takes too much power.
   (a) Speed too high.
   (b) Head lower than rating; pumps too much water.
   (c) Liquid heavier than water. Check viscosity and specific gravity.
   (d) Mechanical defects:
      Shaft bent.
      Rotating element binds.
      Stuffing boxes too tight.
      Pump and driving unit misaligned.
   (e) Wrong direction of rotation.
6. Pump leaks excessively at stuffing box.
   (a) Packing is worn or not properly lubricated.
   (b) Packing is incorrectly inserted or not properly run in.
   (c) Packing is not right kind for liquid handled.
   (d) Shaft scored.
7. Pump is noisy.
   (a) Hydraulic noise-cavitation, suction lift too high. Check with gauge.
   (b) Mechanical defects:
      Shaft bent.
      Rotating parts bind, are loose or broken.
      Bearings worn out.
      Pump and driving unit misaligned.

(*) When connected to electric motors, check up whether motor is across the line, wiring correct, and receives full voltage. When connected to steam turbines, make sure that turbine receives full steam pressure.—*Goulds News.*

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Builders of Well Water Systems for every Municipal and Industrial Need

Education in the Pulp and Paper Industry . . . A 25-Year Record

ROBERT B. WOLF, Manager
Pulp Division, Weyerhaeuser Timber Company

▶▶▶ TWENTY-FIVE YEARS AGO at a meeting of the Technical Association of the Pulp and Paper Industry held in Buffalo, a plan of far-reaching significance to the industry in North America was launched. On that date (September 16, 1918) the Joint Vocational Education Committee of the Pulp and Paper Industry of Canada and the United States was organized and plans for vocational education in this vitally important industry on a continental scale were formulated.

This pioneering step in industrial education on such a large scale was the outgrowth of careful study by technical men and executives in both the United States and Canada.

At that time, we were in the midst of World War I. Our technical men and our far-seeing executives realized the growing necessity to apply scientific knowledge to our own industry as it had been applied to other industries—especially those engaged in the production of war materials. The experiences gained in the prosecution of the first world war brought home to every thinking executive the importance which the scientific approach was assuming in our world economy. They saw that we were becoming specialists and that a broad scientific training, valuable as it had been in the past, was inadequate for the rapid technological development taking place in almost every industry.

Obviously, what was needed was to provide means to make available the scientific knowledge that had been accumulated in the pulp and paper field. To do this effectively required its compilation in such readily usable form as to stimulate a desire upon the part of workmen, foremen, and supervisors to acquire it.

Following the industrial revolution resulting from the invention of the steam engine, the tendency had been to emphasize and rely upon the mechanical performance of industrial operations with comparatively little effort being made to stimulate the creative power of the human mind. As in most all human endeavors, the pendulum which represented the thinking of the industrial leaders had swung too far in the direction of mechanical perfection with far too little regard for the mental perfection of the men who guided the machine. It was a realization of the neglect in the field of technical training and in the stimulation of human interest in natural law that was the motivating spirit behind the formation of the joint vocational education committee.

Prior to the formation of the Joint Committee, there had existed both in the Technical Association of the Pulp and Paper Industry and the Technical Section of the Canadian Pulp and Paper Association, separate vocational education committees which had devoted long and arduous study to the problem of vocational education. Each of these committees, therefore, had a considerable background of experience which was made available to the newly formed Joint Committee. The committee representing the Technical Association had personally interviewed many of our foremost mill executives and had obtained assurance of their co-operation in a sound and comprehensive vocational education program. The Technical Section of the Canadian Pulp and Paper Association had a definite promise of support from their parent organization. Of course, neither the individual executives of the mills in the United States nor the Canadian association were ready to offer financial assistance until some definite plan of action had been worked out and an estimate of the size of the task and the financial support necessary had been made.

The new Joint Committee immediately was faced with the necessity of furnishing text books so designed and grouped as to lead the prospective student in a clear and logical manner through the steps of the particular branch of the industry in which he was most interested and at the same time give him the basic scientific foundation upon which the various phases of the industrial operations are based. At that time, there existed in the English language no comprehensive text books dealing with North American practice in the manufacture of pulp and paper. There were textbooks in foreign languages covering many of the technical aspects of pulp and paper manufacture but these texts were written for but a selected few highly trained technical men. The task of the Joint Committee was to prepare authentic textbooks dealing with North American practices which would be available to all of the mill personnel. Such a text had never before been attempted.

Fortunately, Mr. George Carruthers, who became Chairman of the Joint Vocational Education Committee, had had the benefit of a wide experience in correspondence school education and was able to place this experience at the disposal of the newly formed committee. The committee's first task was to select an editor familiar enough with all branches of the industry to supervise the vast amount of editorial work which this project contemplated. Furthermore, it became evident that an experienced educational director would also be needed. As a result of these deliberations, the Joint Vocational Education Committee elected an executive committee whose function was to carry on the active work involved in the preparation of the textbooks through the hiring of an editor and educational director. It was the further duty of the executive committee to see that sufficient funds were raised to start the project on a sound basis. The personnel of this committee consisted of George Carruthers and T. L. Crossley, representing the Canadian Technical Section, and George E. Williamson, of the Strathmore Paper Company; C. P. Winslow, director of the Forest Products Laboratory; and R. S. Kellogg, secretary of the News Print Service Bureau, representing the Technical Association of the Pulp and Paper Industry. Shortly after the forma-

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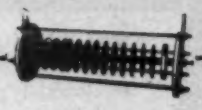

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Average Corrosion Rates

Material	*Inch Penetration Per Yr.*	*Scaling*	*Pitting*
Inconel	0.0022	None	None
Nickel	0.0047	Slight	Slight
Monel	0.0081	Slight	Slight
Cast Iron....	0.44	Yes	Yes

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**From "Corrosion Characteristics of the Distillation of Tallol" F. C. Vilbrand and L. E. Ward Jr., Transactions of the Electrochemical Society, Vol. LXXIII (1938 pp 111-126.)*

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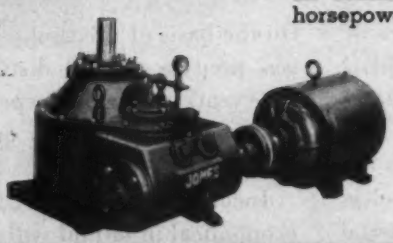

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tion of this committee, C. P. Winslow was obliged to resign because of the many duties involved in the Forest Products Laboratory and R. S. Hatch was appointed as his successor. This committee functioned intact from the time it was organized until January 1, 1942, when Chairman Carruthers resigned because of his desire to retire from active work in the pulp and paper industry. He was succeeded by George E. Williamson as chairman of the Joint Committee and Henry S. Spencer of the Howard Smith Paper Mills, a graduate himself of the Institute of Industrial Arts course on papermaking based upon the published textbooks, was appointed to fill the Canadian vacancy. R. S. Kellogg has acted as secretary-treasurer of the committee since its inception and his zeal and untiring devotion to the affairs of the committee is an outstanding example of personal sacrifice to a worthy cause.

Through the efforts of the Joint Committee and of the many interested members, the Canadian Pulp and Paper Association supplied the sum of $26,859 through a series of five annual appropriations. In the United States, the funds contributed were raised by individual subscriptions contributed by some 200 individual pulp and paper mills as well as manufacturers of pulp and paper mill equipment. The total sum realized in the United States amounted to $30,176.

With the combined contributions of the Canadian Pulp and Paper Association, and the mills and equipment manufacturers of the United States totaling about $57,000, the committee carried through its original program. J. N. Stephenson was selected as editor. Mr. Stephenson fully justified the wisdom of that choice through the years which followed. Through T. J. Foster, founder of the International Correspondence Schools, as consultant on planning procedure, J. J. Clark, a former dean of the International Correspondence School and editor of its textbooks, was chosen as educational advisor both for the purpose of formulating the courses and supervising preparation of the textbooks.

As soon as the organization details and the machinery necessary for the preparation of the textbooks and courses had been settled upon, a ten-year contract was entered into with the McGraw-Hill Publishing Company for the publication of the textbooks. Under this agreement, the textbook committee was to receive a standard rate of royalties upon all sales, and at the same time there was made available to the committee the broad experience of the McGraw-Hill organization in the publication of scientific and engineering texts. The ten-year agreement originally entered into with McGraw-Hill has been renewed each time upon expiration and the relationships with this company have been on a most cordial and informal basis with no occasion for argument or misunderstanding as to the spirit of the contract originally entered into.

The textbooks finally produced under the able supervision of Editor Stephenson and his associates need little descriptive amplification—they speak for themselves. These books represent contributions from more than a hundred technical specialists in the various fields of pulp and paper as well as equipment manufacturers and they portray the most modern North American practices. The original publication of these books extended over a period of four years with Volumes I and II, covering elementary mathematics, physics and chemistry, appearing in 1921; Volume III in 1922; Volume IV, in 1924; Volume V in 1925.

No industry remains static and the committee foresaw the necessity of constant revision to make the textbooks of current value as improvements and modifications appear. They, therefore, set aside all the royalties received for the purpose of periodical revision. It has not been necessary to revise Volumes I and II which deal with elementary mathematics, physics, and chemistry. Volumes III, IV and V, however, giving the details of various pulp and paper mill practices have required two revisions so far. The first revision of Volume III was completed in March, 1927, that of Volume IV in September, 1928, and Volume V in March, 1929. The second revision of these three volumes occurred for Volume III in February, 1937, Volume IV February, 1938, and Volume V in January, 1939. In all cases, the original text and the revisions were submitted to specialists in the different fields covered and critically examined for errors or improvements before they were finally printed and placed on sale.

With the preparation of the textbooks well under way, the committee began to consider ways and means of carrying on an educational program throughout the indus-

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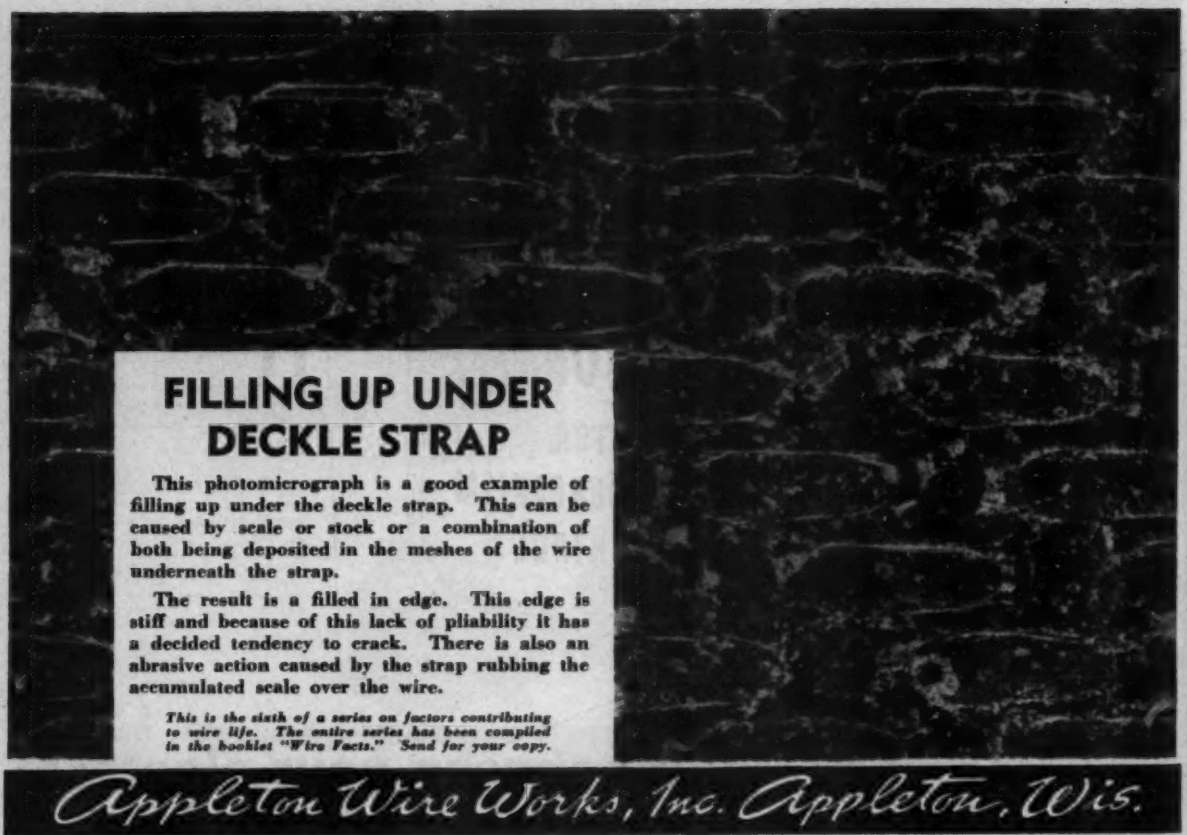
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DECKLE STRAP
This photomicrograph is a good example of filling up under the deckle strap. This can be caused by scale or stock or a combination of both being deposited in the meshes of the wire underneath the strap.
The result is a filled in edge. This edge is stiff and because of this lack of pliability it has a decided tendency to crack. There is also an abrasive action caused by the strap rubbing the accumulated scale over the wire.
This is the sixth of a series on factors contributing to wire life. The entire series has been compiled in the booklet "Wire Facts." Send for your copy.
Appleton Wire Works, Inc. Appleton, Wis.

try. In Canada the Institute of Industrial Arts, Inc., under the Technical Schools Act of the Province of Quebec was founded at Sainte Anne de Bellevue in the Province of Quebec and in this institute correspondence courses were organized.

In the United States the Massachusetts Division of University Extension was sufficiently interested in the project to arrange for handling the complete courses either in class or by correspondence. This course was open to all residents of Massachusetts and was available to residents outside of Massachusetts for a slightly increased cost. International Correspondence Schools were also interested and arranged to give complete courses in the manufacture of pulp, the manufacture of paper, or the manufacture of pulp and paper. The Wisconsin State Board of Education also made arrangements for giving correspondence courses based on the textbooks. In addition to correspondence courses, the University of Maine has used the textbooks in their pulp and paper school. The New York State College of Forestry located at Syracuse in conjunction with Syracuse University also have used the textbooks in their pulp and paper course.

Not long after the publication of the textbooks, it became apparent that in the Province of Quebec, where French is widely used, it would be necessary to provide a French translation. This was undertaken by the Industrial and Educational Publishing Company in Canada and the cost of the copyright privileges was defrayed by the Provincial Government. Part of the French text was prepared in Canada and part was prepared by the faculty of the pulp and paper school in Grenoble, France. It was necessary to alter some of the French text through insertion of Patois terms used in the Canadian mills. This French text has been used both at Grenoble, France, and at the Technical and Paper School at Three Rivers, Quebec.

Through the twenty-five year period in which the Joint Committee has been functioning, the interest in the educational program has continued. Some eighteen hundred students have enrolled in the Institute of Industrial Arts course and two hundred have graduated. The State University extension courses which have been mentioned also have found continuing interest on the part of mill employees. It is interesting to note that those who have enrolled for these courses include men varying in age from seventeen to over sixty. The educational background of these men ranges all the way from those who have not completed common school to those who are university graduates.

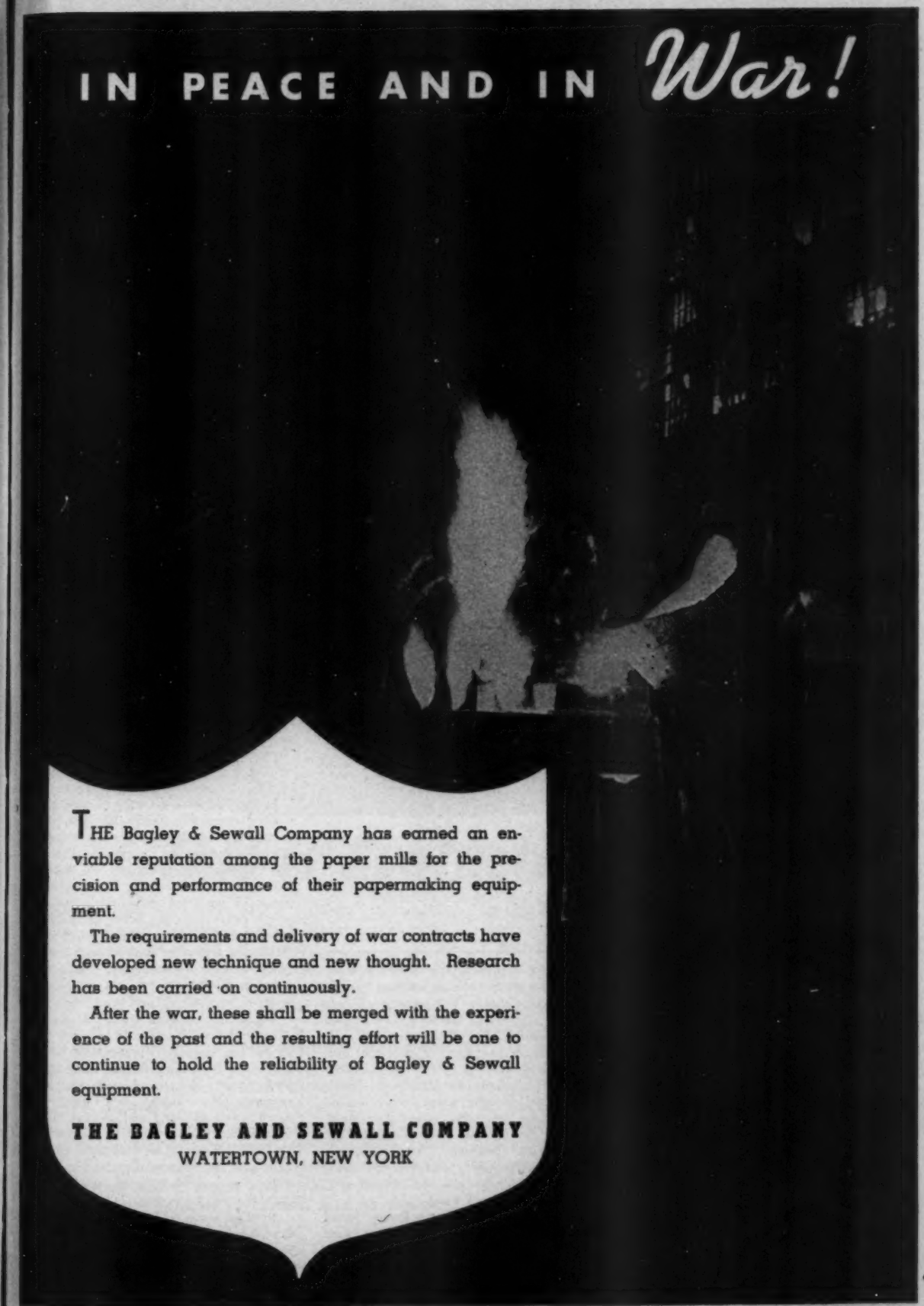
To aid the educational program a number of mills have established local schools at their mills, some for the purpose of giving the entire course and some for ticular interest. Some of these schools have suspended, others are continuing with marked success. Among the most outstanding of the local schools operating at a mill site is that conducted by the Crown-Willamette Paper Company at Camas, Washington. This school has been so successful in its educational program that the work of the students taking the pulp and paper course is given University credit both in the State of Washington and in the State of Oregon.

A variety of means have been used to pay for the instruction received by different correspondence and local schools. In some cases the responsibility is entirely that of the individual taking the course. In other cases, the individual advances all, or part, of the cost of the course and this money is refunded by the mill upon completion of the course. The method of handling the cost of the courses is the responsibility of the individual mills. In many cases where technical men have taken the course, they have obtained enough benefit from the instruction to willingly defray the entire cost themselves.

Probably one of the most significant indications of the continued interest in the educational program of the Pulp and Paper industry is a record of the sale of the textbooks. At the end of June, 1943, a total of 36,113 volumes had been sold. In the elementary courses covered by Volumes I and II, 5,062 copies of Volume I have been sold and 4,260 copies of Volume II. A total of 10,899 copies of Volume III have been sold. Volume III is the one which comprises the various pulping processes. Volumes IV and V deal with all phases of the manufacture of paper; 8,517 copies of Volume IV have been sold and 7,375 copies of Volume V.

In spite of the fact that we now are engaged in a war on a far greater scale than the one in progress when this project

IN PEACE AND IN *War!*



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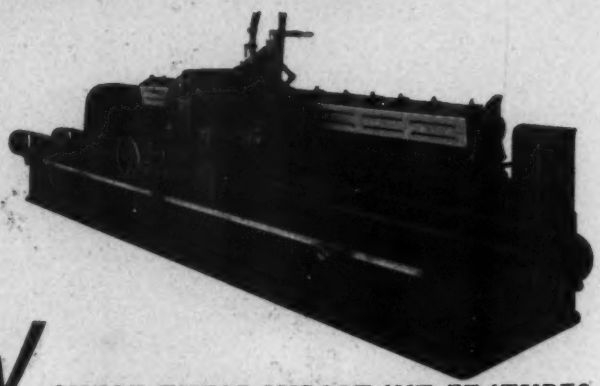

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was initiated, it is interesting to note that in the first half of 1943 a total of 375 volumes of the textbooks were sold. These are divided as follows:

Thirty-nine copies Volume I; 38 copies Volume II; 111 copies Volume III; 84 copies Volume IV; 103 copies Volume V.

Undoubtedly, interest in the educational program is still active even though we are in the midst of a global war. This investment is paying far more "substantial dividends" than mere monetary ones. The firm foundation of factual wealth upon which it is built will enable it to render an ever increasing service to anyone who will take advantage of the opportunities it offers.

Those of us who have watched this unique industrial educational movement from its inception know the vitalizing effect it has had upon our industry. As its value becomes more apparent it will continue to grow for those who receive from it will give to it in even greater measure. Ideas multiply at an accelerating rate as the periodic revisions of the textbooks testify and the effects of each revision radiates out into our industry, increasing its effectiveness and the effectiveness of all who are willing to dig into this rich mine of information that our industry has put at their disposal.

The Story of Amioca

▶▶▶ An industrial research program, started many years ago by a foreign missionary's curiosity, has been carried through agricultural and laboratory phases to the point where a commercial crop of a new kind of grain is available, and sufficient quantities have been processed by American Maize Products Company, and tested by Stein, Hall & Company, Inc., to assure its distribution.

These companies have co-operated in developing Amioca and evaluating it for various industrial uses, such as textile warp sizing, finishing and printing, paper tub, calender and coating work, veneer and laminating adhesives, box and envelope gums and liquid glues.

The story of Amioca goes back to 1908, when an American missionary, whose mind was not too preoccupied with heavenly things to ignore earthly matters, found growing in China a new variety of corn and sent samples to the U.S. Department of Agriculture. The characteristic of this corn which distinguished it from the ordinary variety was that the surface of the cut kernels looked like hard wax. So it was natural for the name "waxy maize" to originate from this waxy appearance, although the kernels do not contain any wax. Present preference is to call this grain glutinous corn, deriving the name from the sticky or glue-like character of the cooked or pasted starch.

The corn which the missionary found was not well developed. The ears were puny and the yields per acre were poor. The U.S. Department of Agriculture's experimental station at Iowa State College, Ames, Iowa, became interested, and in conjunction with Iowa State College began developing hybrid having the pertinent characteristics of glutinous corn. These experiments covered a period of many years. American Maize Products Company gave its financial and industrial assistance during the development of these seeds.

In 1942, a small quantity of seed having yields comparable with the best hybrid corns was available, and a small acreage of glutinous corn was planted. The crop was processed commercially by American Maize Products Company. Plant operations presented no great difficulties. Although starch yields were not good, the hybriding experiments were successful, and actual yields per acre were high enough to make glutinous corn a commercial crop. At the same time sufficient Amioca was produced to have it tested for industrial purposes.

Stein-Hall chemists have found that Amioca differs from ordinary corn starch in several respects, particularly in the character of the gels formed when heated with water. Compared with the brittle character of ordinary corn starch gels, Amioca gels are long and gummy; remain in a fluid condition and do not tend to set back to a paste like ordinary corn starch gels, and are substantially clear in appearance as compared with the opaqueness of regular corn starch gels.

In these respects Amioca resembles tapioca flour more nearly than does corn starch. It is chiefly because of these properties that Amioca has been found successful for many purposes which tapioca has served.

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Stein-Hall has also found that the resemblance of Amioca to tapioca flour is carried through in enzyme conversions as well as in the formation of dextrines. The amount of liquefying enzymes necessary to convert Amioca to a given viscosity is less than that required with corn starch and more nearly like the amount required with tapioca flour. In the manufacture of dextrines, the amount of acid required to produce dextrines of different types approximates more nearly the amount required with tapioca flour than with corn starch.

In clarity, transparency, and fast tack, dextrines and gums manufactured from Amioca resemble tapioca flour and can be used satisfactorily for a number of purposes where tapioca has been used before.

Stein-Hall trials with Amioca Starch for textile warp sizing, finishing and printing showed results for warp sizing and finishing comparable with those obtained with potato starch and tapioca flour. Cotton warps sized with Amioca remain pliable and do not require high humidity in the weave room, which is necessary when regular corn starch is used. Fabrics finished with Amioca have the fullness of hand characteristic of those finished with tapioca and potato starch.

Clay coating of paper is done with casein, soya bean protein or starch, depending on whether or not water resistance is one of the specifications for the coated paper. Of the various starches used for coating, oxidized starches are generally regarded as the most satisfactory because of the better flow characteristic. Stein-Hall trials have shown that, when compared with oxidized starches, Amioca shows up remarkably well.

Stein-Hall has also proved that as an adhesive Amioca can be used satisfactorily for veneer work, giving a fluid glue of high solid content and good bonding strength.

Gums made from Amioca bases for boxes, envelopes, tube winding, etc., give results which in most respects are as satisfactory as those made from tapioca flour.

In 1943, additional quantities of hybrid seed were available and through contacts with the farmers arrangements were made to plant approximately 3,000 acres. This will make available sufficient grain to produce between four and five million pounds of Amioca early in 1944. Seed is now available for considerably enlarged acreage to be planted in 1944 for use as Amioca in 1945.

The future of Amioca and the rate of its expansion for industrial uses depends on general business conditions both now and after the war.

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Convention Papers . . . Abridged

The Action of Nitrogen Dioxide on Unbleached Pulp

GEORGE L. CLARKE[1], E. HEUSER[2] and CHARLES M. SIGVARDT[3]

Numerous attempts to alleviate the present shortage of chlorine and chlorine derivatives for pulp bleaching have been undertaken in many laboratories by substituting other oxidizing agents for chlorine. It was thought that, in the search for such substitutes, the oxides of nitrogen should not be overlooked. On this basis, a study was made to explore the possibilities of these oxides. Although this study is only of a preliminary character, the results thus far obtained may be of interest, because they may entice others to look further into the commercial possibilities which they reveal.

Of the various oxides of nitrogen, nitrous oxide (N_2O) was found to have no effect on unbleached pulp; this could be expected since this gas, although easily soluble in water, is almost inert under ordinary conditions; only at rather high temperatures does it decompose into nitrogen and oxygen. Nitric oxide (NO) is only sparingly soluble in water; besides, owing to the ease with which it combines with oxygen from the air, any oxiding effect observed in using nitric oxide results from the presence of nitrogen dioxide (NO_2) or nitrogen tetroxide (N_2O_4). Thus, the chances were that, of the three oxides mentioned, nitrogen dioxide would be the only one suitable for delignification of pulp.[4]

With one exception, the literature apparently contains no reference to the use of nitrogen dioxide, or, for that matter, of the other oxides for the bleaching of wood pulp. The exception is an attempt to utilize a mixture of nitrogen oxides and ozone as produced by means of an electric arc, an attempt which, however, does not seem to have been successful. (Meuser, Opfermann and Hochberger, Die Bleiche des Zellstoffs, Part II, p. 322. Berlin, Elsner, 1936; Munds, *Wochenbl, Papierfabr.* 61: 679, 1293, 1930).

Nitrogen dioxide is a gas above a temperature of 21.6 degrees C.—i.e., it may be liquified by cooling below this point. The nitrogen dioxide used in the experiments reported here was first prepared in the laboratory by known methods and later employed as a commercial product, available in steel cylinders from Du Pont de Nemours & Company, Wilmington, Delaware. Liquid nitrogen dioxide dissolves cellulose in the form of cotton linters and wood pulp within a few minutes. On evaporation of the nitrogen dioxide from a layer of the solution on a glass plate, a film of regenerated cellulose is obtained which, however, is rather brittle. The cellulose may be regenerated as a precipitate by adding petroleum ether to the solution. Even wood meal dissolves in liquid nitrogen dioxide.

When nitrogen dioxide is introduced into a suspension of unbleached pulp, the latter acquires almost at once a brown color, indicating that a reaction has taken place. The brown material, obviously the lignin constituent of the pulp, modified by the action of the nitrogen dioxide, or its conversion products, is sparingly soluble in water. In dilute alkali, such as aqueous solium hydroxide, it dissolves to a greater extent, but not completely even at elevated temperatures. Sulphur dioxide changes the brown color of the treated pulp to a bright yellow; however, on washing with dilute sodium hydroxide solution, the yellow color turns into an orange shade. A similar phenomenon was observed when the brown pulp material was treated with dilute inorganic acids or oxalic acid; it became light-yellow in color but changed immediately to a dark brown on washing with dilute alkali. This behavior suggests that, under the influence of nitrogen dioxide, some organic matter is changed so that it acts as an indicator.

(1) Southern Kraft Corporation; (2) research associate, and (3) student, The Institute of Paper Chemistry.

[4]Preliminary experiments were made some years ago under the direction of the senior author by E. Howard in the Research Department of the Canadian International Paper Co., Hawkesbury, Ontario, Canada.

This section includes abridgments of some of the papers read at the **Army and Navy Conference,** sponsored by **TAPPI,** in Chicago, September 21-24. Previous installments were published in the October and November issues.

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The intensity of the brown color of unbleached pulps, as it results from the treatment with nitrogen dioxide, varies with their bleachability. With partly bleached (chlorinated) pulp, the differences are greater than those produced by chlorination alone and permit them to be used as a more accurate measure of the bleach requirement in the stage following chlorination. The color differences may be expressed by reflectance values (brightness) as obtained with the General Electric recording spectrophotometer.

If nitrogen dioxide is to be used as bleaching agent, one can hope to use it only for accomplishing a partial bleaching effect, in much the same way as chlorine is employed in a first-stage (chlorination) bleaching.

To insure any substantial degree of delignification, the temperature has to be relatively high. In fact, it was only when the temperature of a 3 per cent pulp suspension was raised to about 90 C. that the permanganate figure decreased to an extent which would reduce the amount of bleach to be used in the second stage to a reasonable figure. The time necessary to accomplish this objective was 1.0-1.5 hours. The quantity of nitrogen dioxide used in the earlier experiments was relatively high, varying from 3-4 per cent on the dry weight of the pulp. Later, it was found that this quantity could be reduced to 2.35 per cent, and indications are that it may be reduced still further.

In the earlier attempts to bleach the nitrogen dioxide and alkaline-extracted pulps in a second stage with calcium hypochlorite to the desired color, rather large amounts of hypochlorite were required to reach brightness values of 80 and higher. Under such conditions, the total saving of chlorine by replacing part of it with nitrogen dioxide was rather limited. Later experiments revealed that brightness values from 70-75 may be obtained with 2-3.5 per cent calcium hypochlorite. Thus, for bleaching a Mitscherlich sulphite pulp, having a permanganate number of 15.7, only 1-1.5 per cent chlorine were required, the rest of the bleaching agents being nitrogen dioxide and sodium hydroxide.

The physical properties of a pulp bleached with nitrogen dioxide in the first and calcium hypochlorite in the second stage to a brightness of 80 were somewhat lower than those obtained with the same pulp bleached to the same brightness by the customary two-stage chlorination-hypochlorite method. However, the difference was not great.

There was also little difference in the alpha-cellulose content of the two pulps, the pulp bleached with nitrogen dioxide in the first stage being slightly higher (85.5 and 85.0 per cent, respectively). These figures are rather low and are probably explained by the unusually high pentosan content of this type of pulp. With a differently cooked pulp, alpha-cellulose contents of between 87 and 88 should result from either of the two bleaching methods.

The only pronounced difference was in the viscosities of the two pulps, that of the nitrogen dioxide-bleached pulp being considerably lower than that of the chlorine-bleached material. The figures were 39 and 67 centipoises (determined by the TAPPI method). The lower viscosity indicates that the cellulose has suffered more degradation during bleaching with nitrogen dioxide than when bleached in the customary way.

The conversion of nitrogen dioxide into nitrous and nitric acids in the presence of water seems to indicate that it is the action of these two acids, rather than that of the nitrogen dioxide as such, which is responsible for the bleaching effect of the latter. Preliminary experiments showed that of the

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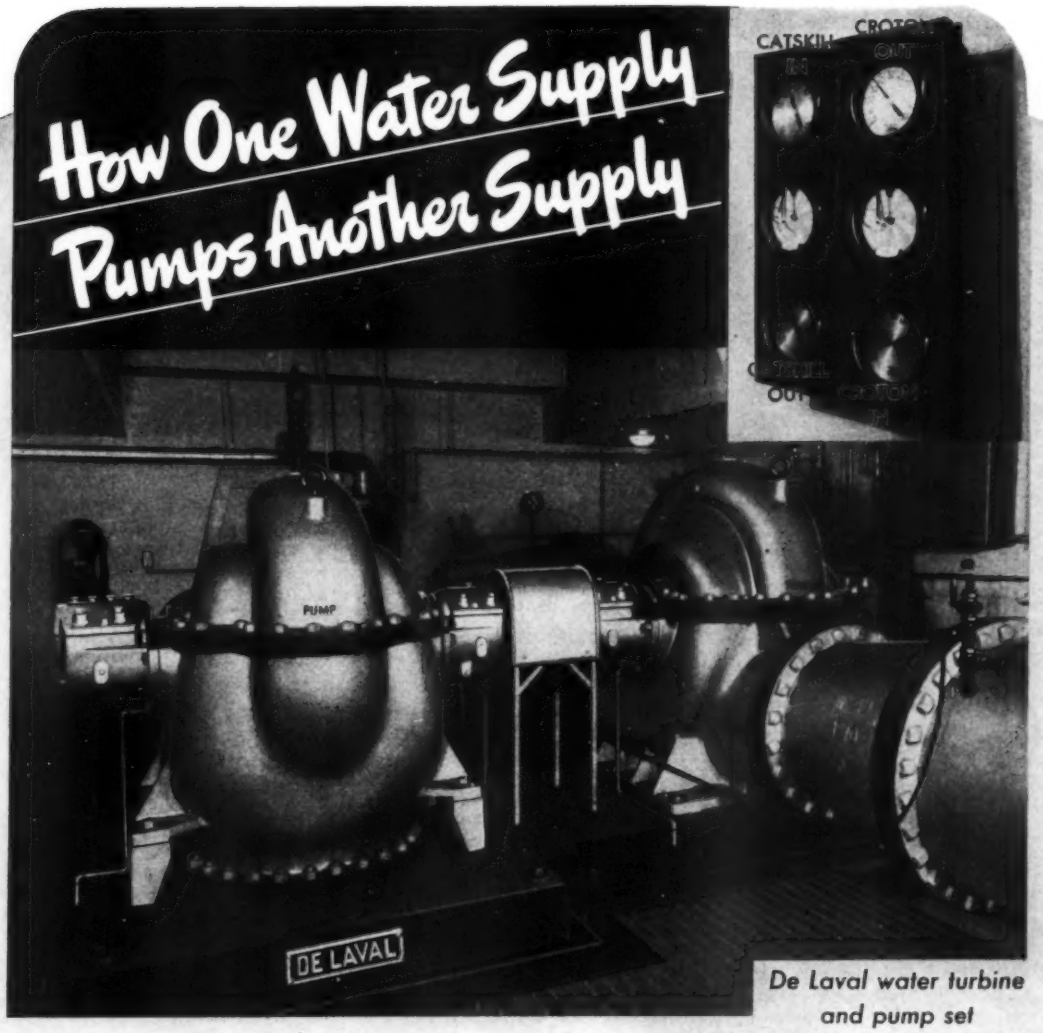

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two acids, nitrous acid is by far the more efficient. Whereas nitric acid alone applied to a 3 per cent pulp suspension at 90 C. for 30 minutes or longer had very little bleaching effect, nitrous acid under the same conditions reduced the permanganate number from 14.9 to 8.3. However, nitric acid seems also to play an important part, because it increases the solubility of the primarily modified lignin in dilute caustic soda.

As regards the mechanism involved in the action of nitrogen dioxide on unbleached pulp, the observation that the nitrogen dioxide-treated and caustic extracted pulp contained measurable amounts of nitrogen would suggest that one of the reactions involved consists of nitration—i.e., the introduction of nitrogen dioxide groups into the lignin molecule. Possibly this is the first phase of the reaction, the second consisting of the oxidation of the nitro-lignin by the nitric acid, resulting in the solubilization of the latter.

In an attempt to reduce the formation of the acids and, thus, the degradation of the pulp, experiments were made with unbleached pulp samples, the moisture contents of which were reduced to 6 and 1 per cent, respectively.

It was found that the degrading effect on the dry pulps was somewhat greater than on the pulp used in slush form. Obviously, the water present in the dry pulp was sufficient to produce enough of the acids at a concentration which was considerably higher than when the pulp was used in an aqueous suspension and which thus attacked the cellulose to a greater extent.

The experiments seem to indicate that the use of nitrogen dioxide has certain possibilities for the partial bleaching of pulp. However, considerably more work would have to be done to provide a process which could compete with the use of chlorine.

Sulphite Pulp Production: Some Factors Pertinent to Meeting War-born Shortages

J. H. McGOVERN[1] and G. H. McGREGOR[2]

Present trends in the sulphite pulp industry indicate a continued demand at the current high level but a decline in production, with the probability of an acute pulp scarcity in 1944. This prospective reduction in sulphite pulp production arises primarily from shortages of woods labor and logging facilities employed to produce pulpwood. Provision for sufficient woods labor is a direct and obvious way of averting the impending pulp scarcity. The threatened shortage can also, however, be lessened by utilizing species that are available but seldom used for sulphite pulping, and by operating the pulp mill so as to obtain the maximum yield of pulp from the available wood.

(1) Associate technologist, and (2) senior engineer, Forest Products Laboratory, Madison, Wis.

Pulping Procedures

Pulping most of the less common species by the sulphite process requires no radical changes from the pulping procedures used for the customary pulpwoods, although several points of difference in pulpability and pulp characteristics can be mentioned.

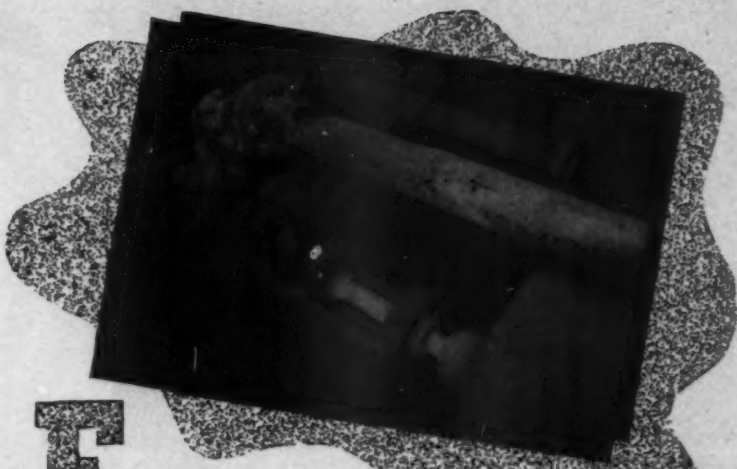
Since aspen and cottonwood, because of their relatively lower densities (particularly that of northern grown aspen) may be charged in slightly lower weights than spruce or hemlock (approximately the same as that for fir) some slight adjustment in acid concentration or temperature schedule may be made with advantage. In practice, however, the cooking procedures for woods of either higher or lower density are generally the same. Controlled chip packing, with the resultant increase in digester charge, may offset natural differences in density between these hardwoods and other softwoods. Aspen and cottonwood chips are penetrated with sulphite acid in the same time as spruce chips, but they appear to delignify somewhat more rapidly than the spruce. Other conditions being equal, these hardwoods will, therefore, require a shorter cooking time than spruce. The color of the waste liquor at the end of the digestion will be darker than that of spruce but lighter than that of hemlock. The percentage yields by weight of pulp from aspen and cottonwood will be higher than those from most other species because of their higher cellulose contents, and this partially offsets the effect of their low densities on yield per unit of wood volume. The aspen and cottonwood pulps will have strength

properties, especially tearing strength, inferior to those of pulps from the commonly used conifers. Nevertheless, these hardwood pulps will be valuable for many purposes. Aspen pulp from green wood may have a tendency to be pitchy.

The heavier hardwoods (birch, beech, maple, and tupelo) will make up a heavier digester charge than spruce or hemlock. Sometimes an increase of thirty per cent or more may be realized. Since the volume of acid charged will be equal to or less than that usual with these heavy woods, an increase in the contents of both total and combined sulphur dioxide in the cooking liquor is usually considered essential. The chips from these hardwoods are penetrated by the sulphite acid with slightly more difficulty than spruce, so that a somewhat longer penetration period is generally recommended for the hardwoods. Although birch chips (and probably maple and tupelo) are delignified at the same rate as spruce chips, the dense nature of the wood appears to cause the diffusion of the cooking liquor into and out of the chips to be somewhat slower than for spruce. Consequently, a slower rise to the cooking temperature may be necessary in order to insure uniform pulping action. The sulphite pulps from birch and tupelo will approach eastern hemlock in all but tearing strength. The maple and beech pulps will be somewhat inferior to the birch and tupelo pulps. White birch pulp will tend to exhibit the same pitchy nature as spruce.

Northern and western pines and western larch, although available in considerable amounts as second-growth material and sawmill waste, have found only limited utilization in the sulphite pulping industry because of the incomplete and unsatisfactory reduction to pulp of some growth types under ordinary sulphite pulping conditions. The difficulty in pulping these species lies in the heartwood. It is well known that the sapwood from these species can be pulped with no trouble. The refractoriness of the heartwood toward sulphite pulping liquor can be alleviated considerably, however, by cooking under milder temperature conditions for longer times and with liquors stronger in sulphur dioxide than normally employed in cooking spruce. Even though the screenings obtained may be high and the pulp quality inferior, such pulp can find an important place in fulfilling the pulp requirements for next year. Sawmill waste, if consisting mostly of slabs and edgings, may contain a high percentage of sapwood. In this case pulping processes satisfactory for the common pulpwoods can be applied.

The heartwood of the southern pines, tamarack and Douglas fir is generally too refractory for the practical application of the sulphite process, although with drastic pulping procedures a low yield of product may result which is suitable for certain chemical derivatives or, where color is not important, for use as an unbleached pulp. The changes in the cooking procedure suggested for the northern pines may be helpful. There may, however, be available to sulphite mills in southern pine areas wood of young growth containing little or no heartwood; or, at sawmills, wastes of southern pine or Douglas fir slabs and edgings



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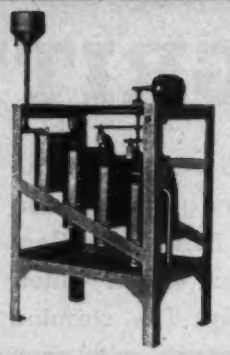

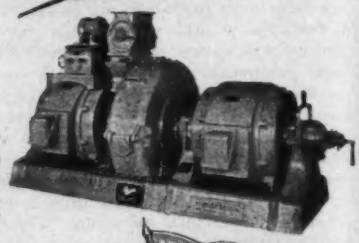

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composed predominately of sapwood may be available. In these cases usual sulphite pulping practice can be employed.

Western red cedar is reported to be satisfactorily reduced by the sulphite process. The pulp, however, is said to be difficult to bleach and therefore probably would find its best outlet as an unbleached product where color is not important. Sitka spruce is readily reduced by the sulphite process to a high quality pulp with exceptionally long fibers but with a very high resin content. There appears to be no information available on the sulphite pulping of alder, but presumably it would react similarly to birch or beech.

Although there are undoubtedly many advantages to be gained from cooking only one kind of wood at one time, the pulping of mixtures of conifers and hardwoods is a practical possibility and has been done in many mills to some extent for a number of years. Certain adjustments in the pulping procedure may be needed. Probably these adjustments should be in favor of species difficult to pulp.

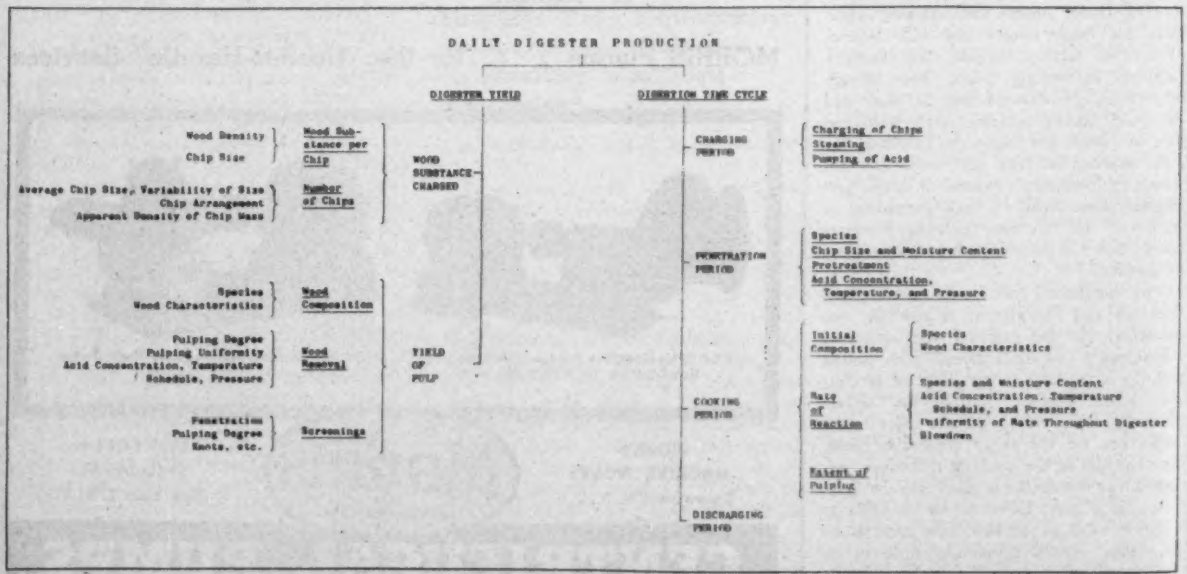


Fig. 1—Sulphite process variables affecting pulp production.

Sulphite Process Variables Affecting Pulp Production

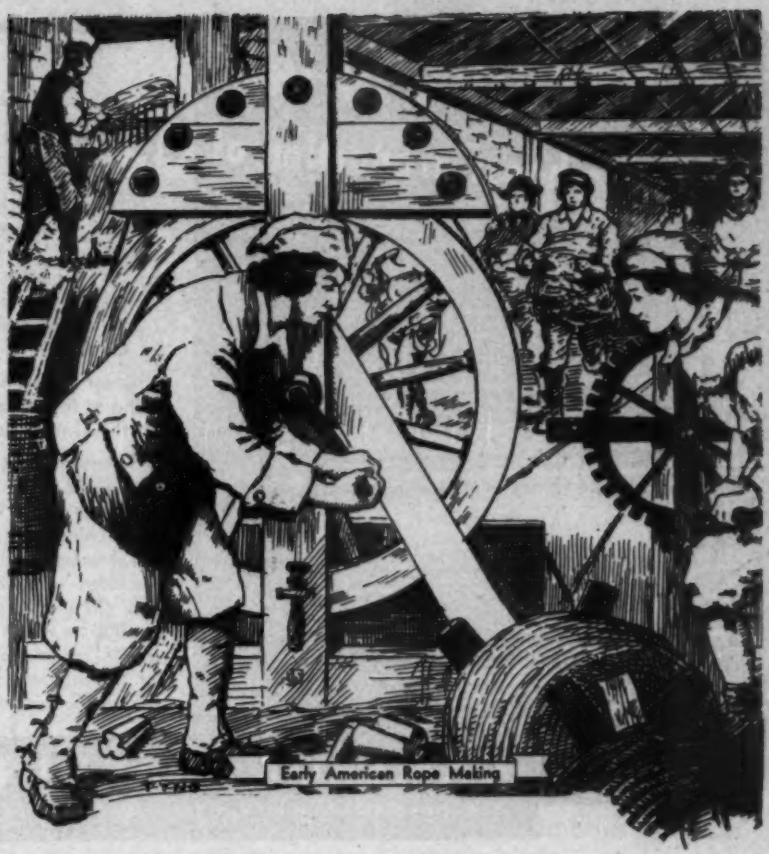
The daily production of a sulphite digester is measured by the amount of pulp made per digester, or the digester yield, and the number of times the digester can produce this pulp in a day, or the digestion cycle. These main factors have subfactors determining their magnitude. Some of the subfactors and their interrelations are outlined in Figure 1. In considering this chart, it is essential that pulp production be considered in relation to pulp quality. It also must be noted that certain factors, such as wood species and digestion conditions, affect the final product in several perhaps conflicting ways, and should, therefore, be considered on an over-all basis. Finally, control of the sulphite process variables to the greatest extent possible is a prime necessity if the pulping reactions are to be conducted so as to get the most out of the wood.

The actual amount of wood substance charged into a digester depends on (a) the average weight of wood substance in each chip of average size and (b) the number of chips in the digester. The weight of wood substance in a chip of a given size depends primarily on its density, which in turn depends on the species and its growth characteristics. The advantages gained by using as dense a wood as possible cannot be emphasized too strongly.

The number of chips present in a unit of digester space depends mainly on (1) the average size and the uniformity of size of the chips, (2) the arrangement of the chips in the digester, and (3) the apparent density of the chip mass. An orderly arrangement of the uniformly sized chips of medium length (½ to ¾ inch) will undoubtedly lead to more efficient use of the digester space and of the wood than an uncontrolled charge of chips varying widely in length and shape. It may be necessary, however, to sacrifice to some extent the advantage of chip uniformity, in order to utilize the productive capacity of the chipper to the best advantage.

In mills where the pulpwood supply is adequate, it is desirable to use the digester space as efficiently as possible. The use of high density, wet wood, with steaming of the chips during charging, can increase the wood charge as much as 25 per cent. In this step, caution is necessary because, with an excessively large charge of wood, there may not be enough acid charged, the acid may be too weak to carry on the pulping reactions, or the contents of the digester may not be discharged satisfactorily. Each mill needs to determine the proper balance between the wood charge and the pulping operation.

The amount of wood material made soluble by the sulphite pulping reaction controls the percentage yield of pulp from a particular wood. An ideal pulping process would preserve all the alpha-cellulose plus as much of the hemicelluloses, lignin, and extraneous matter as could be included without affecting adversely the quality of the pulp for papermaking or other purposes. Actually, a large portion of the hemicelluloses and a portion of the alpha-cellulose which has become nonresistant in the strongly acid conditions prevailing during



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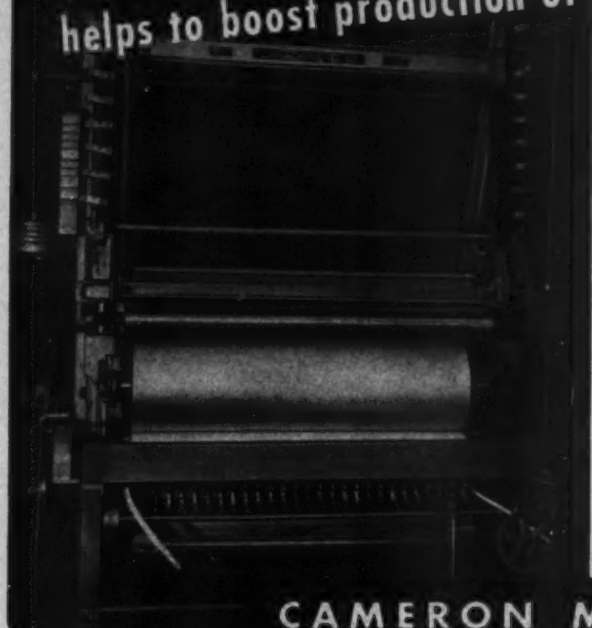

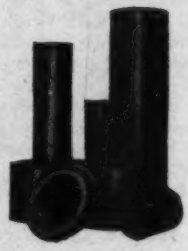

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cooking are made soluble before the desired delignification has taken place. The relative proportions of cellulose and lignin removed depend on the rate and extent of the reactions involved. Practically, they depend on (a) the degree of pulping, (b) uniformity of pulping, and (c) pulping conditions.

To obtain a high utilization of the wood, it may be definitely advantageous to terminate the pulping short of the fiberizing point and to complete the fiberization mechanically. The exceptionally high yields of semichemical pulp thereby resulting will then be limited only by the ability of the material to be blown from the digester, usually near the sixty per cent yield.

The effect of uniformity of pulping on percentage yield is concerned mainly with digester operation. It is believed that some digesters are operated with too little regard for this point.

An increase in the excess sulphur dioxide content, other things being equal, causes a slight decrease in yield, although generally this decrease can be more than offset by adjustments in the other conditions which are allowed by the use of the increased acid strength. An increase in the concentration of combined sulphur dioxide of approximately 0.2 per cent (at a constant acid-wood ratio), on the other hand, is reported to bring about a yield increase of one per cent. The percentage yield is definitely unfavorably affected by high pulping temperatures. An increase in temperature of 5 C. within the usual range of pulping temperature causes a yield loss of approximately one pound of pulp for every 100 pounds of moisture-free wood charged to the digester. This loss is somewhat higher at higher temperatures and lower at lower temperatures. It is apparently good advice from a standpoint of yield to select the lowest cooking temperature which will give the required pulping action in the available time. Digester pressure has an indirect effect on yield in that it controls the concentration of excess sulphur dioxide available at the cooking temperature.

The screenings, or incompletely pulped chips, which do not readily fiberize upon discharge of the digester represent for the most part a loss as far as higher grade sulphite pulp is concerned. It is obvious that each pound of screenings avoided means approximately an additional pound of usable pulp produced. Although screenings after suitable refining do have some fiber value (and they should be so utilized as much as possible under present conditions) their production means a partial loss of valuable raw material. When cooking proceeds beyond the fiberizing point, screenings arise mainly from the formation of insoluble lignin compounds in the interior of the chip, caused by an incomplete penetration of the bisulphite at the cooking temperatures. The cooked chips then possess the familiar dark, hard centers. The production of this type of screenings can be avoided by any means that will insure the presence of the bisulphite in the chip before the maximum pulping temperature has been reached. Obvious remedies are (1) a longer time at the penetration temperature, (2) a high concentration of excess sulphur dioxide (which aids bisulphite penetration), and (3) use of small, uniform chips. A less serious source of screenings, or tailings, is the chip that is uniformly but not quite completely delignified past the fiberizing point. This type of screenings is caused by zones of low temperatures or by insufficient chemical in the digester, the remedies for which are obvious. Other sources of screenings are the nonpulpable knots and bark that unavoidably accompany the chips. Preparation of the chips in such a way as to keep fiber loss at a minimum may mean, on the other hand, a relatively high percentage of the last mentioned type of screenings.

Normally, a high pulp demand can be met by increasing the digester output through decrease of the "cover to cover" cooking time to the extent that a satisfactory pulp is produced with no serious disruption of the chip, acid, and pulp flow through the digestion operation. A decrease in the time may be advantageous, even if at some expense of the yield of pulp from the wood.

Raw materials should be charged in the digester in a minimum time consistent with having the materials in the most favorable condition for the penetration period. This means that sufficient time should be allowed for chip charging, so that a desirable orderly arrangement is obtained. Although steaming the digester during or after the chip charging is not universal procedure, the time so spent may be well worth while

from the standpoints of increased wood charge, moisture uniformity and penetrability. The acid pump should be of adequate size, and there appears to be no advantage in pumping the acid at a rate below its maximum capacity.

Penetration of sulphite cooking liquor must be substantially completed before a certain critical temperature is reached if burned centers in the wood chips are to be avoided. To insure the best yield, therefore, an adequate time should be allowed for penetration. In addition to chip size, the penetration time is dependent on (1) species and structural features of the wood, (2) chip moisture content, (3) pretreatment, (4) penetration conditions. As far as wood species and structure are concerned, the spruces, firs, and poplars are somewhat more readily penetrated than dense hardwoods and the pines; sapwood is more rapidly penetrated than heartwood, and springwood more rapidly than summerwood. Chips with a uniform moisture content are more satisfactorily penetrated than those of varying moisture content. Pretreatment — for example, precirculation of hot acid—enables a considerable shortening of the normal penetration time. A high sulphur dioxide content in the liquor aids the penetration of the bisulphite, and the higher the penetration temperature (below the critical temperature) the more rapid the penetration. A high operating pressure, permitted by high sulphur dioxide concentrations, indirectly aids penetration.

Essentially, the time required for lignin removal depends on the amount initially present, the rate of its removal, and the amount left in the pulp. Certain species, or growth types within species, may require a longer cooking time or a faster pulping rate than others because of a high initial lignin content; further, because of a low cellulose content in such wood, the additional pulping may cause the normally low yield of pulp to be still lower. Since the most important single factor determining the rates of reaction is temperature, the temperature schedule used should be that which results in the most rapid removal of lignin consistent with minimum cellulose removal. Generally this condition is satisfied at temperatures below 140 C.

A less important factor affecting the reaction rates is cooking liquor concentration; an increase in total sulphur dioxide increases the rates of reaction of the cooking liquor with the lignin and the cellulose, and an increase in combined sulphur dioxide acts in the opposite way.

Another factor affecting the reaction rates in the cooking period is the blowdown time. A lengthy blowdown lowers the reaction rates because of removal of sulphur dioxide. A blowdown accompanied by steaming for high chemical recovery may be unfavorable to pulp yield, because of the resulting dangerously localized high temperatures and presence of organic acids.

The final major factor affecting the cooking period is the degree of pulping. This variable is complementary to pulp yield. Other conditions being the same, the less a pulp is delignified (by use of a shorter cooking time) the higher is the yield obtained.

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the time consumed in discharging the digester, is affected by the method of discharge, whether by blowing or dumping. Digester yield is not believed to be related to this operation.

Sulphite Mill Fiber Loss

There are other operations in the sulphite mill, such as chip preparation and pulp washing, screening and bleaching, which can bear close scrutiny in the interest of increased pulp production. These operations are often the source of considerable fiber loss.

In order to realize the maximum amount from each log entering the mill, it may be advisable to sacrifice pulp cleanliness to some extent. This means that the barking and wood cleaning operations should be conducted so as to remove a minimum of good fiber at the expense, perhaps, of leaving an appreciable amount of dirt-producing material with the chips. This scheme will throw an increased burden on the pulp screens. The slashing, sawing, and chipping operations should be done to produce a minimum of fine material. The chip screening operation should eliminate only the decidedly objectionable material. The chips that then go into the digester will be somewhat nonuniform in size, and adjustments in the cooking procedure may be needed to counteract this. The use of the pin chips and coarse sawdust from the chip screens should warrant consideration. For example, the pin chips may be cooked in admixture with the regular chips or separately.

The white water from washers and the thickeners can be used to supply part of the wash water in the blowpit. In this way the fibers are filtered from the white water. There should, if at all possible, be some kind of fiber recovery system for the white water. The pulp screenings should all be collected, refined if need be, and utilized in such products as roll wrapper, car liner, and board filler. The rejects from the knotter screen can be refined in a hammermill and blended with the screenings. The screen efficiency should be high so that the screenings contains as little acceptable fiber as possible.

The relatively low pulp brightness ceiling now permitted makes it possible to conduct the bleaching operation with a low shrinkage. A single stage hypochlorite bleach, may produce a pulp with the necessary brightness without the losses of carbohydrate materials which occur in multiple stage bleaching, especially in those employing caustic extraction.

The Nature of Lignosulphonic Acids Fractionated by Chemical and Physical Methods*

WILLIS M. VAN HORN, Research Assistant
The Institute of Paper Chemistry

The question whether, in the sulphite cooking process, the lignin is sulphonated without degradation of the lignin molecule (Figure 4), or the lignin molecule is split into smaller fragments (according to Figure 5), is not only of great importance in the sulphite pulp industry from the standpoint of the sulphur consumption but also in the utilization of the sulphite waste liquor. It is known that, the higher the degree of sulphonation of lignin, the more difficult is the isolation of the lignosulphonate by precipitation; on the other hand, a highly sulphonated lignosulphonic acid gives a higher yield of vanillin (Hägglund, *Holzchemie, 2nd ed.*, p. 165 ff.). In order to obtain a solution of lignin, a sulphur content of at least 3.5 per cent is necessary; however, the actual consumption of sulphur in the mill is much higher. Mitchell and Yorston (*Pulp Paper Mag. Canada* 37:195, 1936), expressed the practical need for more information on this subject, when they stated that: "While there is evidence that the consumption of sulphur (in sulphite pulping) is greater than it need be, not enough is known of the reactions in which the excess sulphur takes part to enable any methods of reducing that consumption to be suggested."

It was the objective of this investigation to devise a scheme of fractionation and purification of lignosulphonic acid salts based on chemical and physical methods

*A portion of a thesis submitted in partial fulfillment of the requirements of The Institute of Paper Chemistry for the degree of Doctor of Philosophy from Lawrence College, Appleton, Wis., June, 1942. This work was carried out under the direction of F. E. Brauns and M. S. Buchanan.

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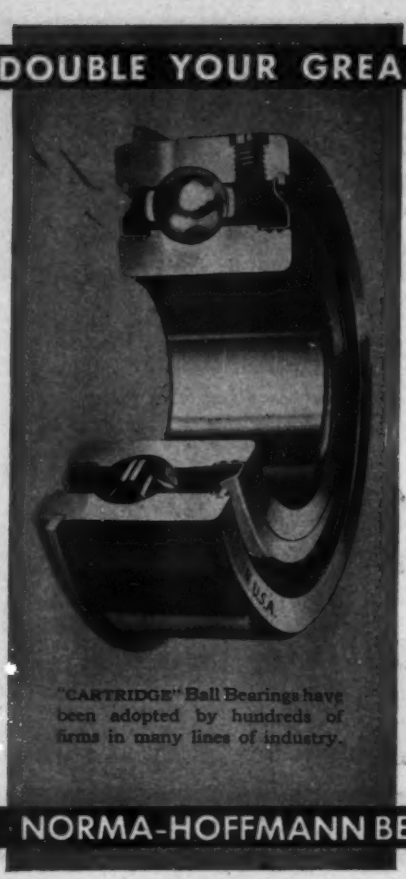

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which, when applied to two sulphite waste liquors prepared by widely different cooking conditions, would yield fundamental information concerning the degree of sulphonation of the lignin. At the time it was hoped that data could be obtained which would permit conclusions as to whether a degradation of the lignin molecule takes place or whether polysulphonated lignosulphonic acids are formed without splitting of the lignin molecule. In the latter case, only a lignomonosulphonic acid (that having the lowest possible sulphur content), or a lignotetra sulphonic acid (that having the highest possible sulphur content), would be obtained in a relatively pure state; any di- or trisulphonic acid formed would be present as mixtures of such composition that they would analyze as a uniform lignosulphonic acid. The final goal was not reached, because of difficulties caused in part by the physical and chemical properties of the lignosulphonic acids under investigation and in part by the present emergency, which made it impossible to obtain suitable equipment. Because there is no chance of continuing the work for the duration, the results of this investigation are reported.

In order to obtain sulphite waste liquors of widely different properties, two laboratory sulphite cooks were carried out under the conditions indicated in Table I.

Black sprucewood from a freshly cut tree was reduced to sawdust and extracted first with 95% ethanol and then in a Soxhlet apparatus with a 2:1 alcohol-benzene mixture. It was washed twice with ethanol, twice with water, and air dried to a moisture content of about 10%. Cook I was carried out in a stationary stainless-steel autoclave having a capacity of 5.500 ml., and Cook II in a 25-liter horizontal rotary stainless-steel digester. The waste liquors were separated from the pulps by filtration, the latter being washed with water containing some sulphurous acid. The waste liquors and their corresponding wash waters were combined and concentrated under reduced pressure to about 1.500 ml. With the removal of the free sulphurous acid, calcium sulphite and calcium sulphate separated and were filtered from time to time. Whereas the sulphite waste liquor from

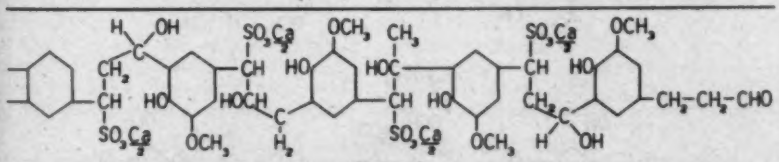

Figure 4

Table I—Cooking Conditions

	Cook I	Cook II
C_aO, %	1.0	1.0
Combined SO_2.%	1.14	1.14
Total SO_2%	4.5	5.5
Maximum temperature, °C.	125	140
Time to maximum, hr.	3	4
Time at maximum, hr.	5	5.5
Liquor : wood ratio	8:1	8:1

Cook I had the normal light brown color, that from Cook II was almost black. The latter had a slight odor of a burnt cook because of the drastic cooking conditions employed. The concentrations under reduced pressure and all other distillations *in vacuo* were carried out in a nitrogen atmosphere to avoid any oxidation of the lignosulphonic acid. From the lignin content of the original wood and that of the pulp, it was calculated that 262 grams (65%) of the lignin were dissolved in Cook I and 398 grams (98.9%) in Cook II. Both concentrates were made up to 2,000 ml. and analyzed; the results are shown in Table II.

Table II—Analysis of Lignosulphonic Acids

	Cook I	Cook II
Density	1.146	1.197
Solids by weight, %	31.9	41
MeO of the solid, %	5.9	7.5
Ash, %	18.3	4.7

In order to separate the lignosulphonic acids from the principal amount of carbohydrate material, the two concentrated

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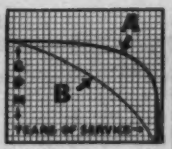

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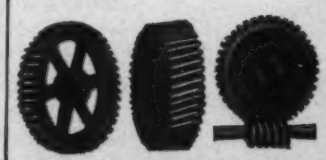

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solutions were treated with a slurry of lime with vigorous stirring, heavy precipitates being formed in each case. The precipitates were filtered and washed three times by suspending them in water, allowing the mixtures to stand for 20-24 hours, and filtering; the basic calcium lignosulphonates (IA and IIA) had a canary-yellow and a dark brown color, respectively. The filtrates and their corresponding wash waters were combined, acidified with sulphurous acid, and concentrated, giving the calcium hydroxide-soluble fractions, I-sol. and II-sol. To recover the calcium lignosulphonates, IA and IIA were suspended in water and sulphur dioxide was passed into the suspension until a *p*H of 2 was reached; this caused the precipitation of calcium sulphite, while the calcium lignosulphates went into solution. The filtered solutions were concentrated *in vacuo*, and the precipitation with lime was repeated with both products. The filtrates were added to I-sol. and II-sol., respectively. The basic calcium lignosulphonates were decomposed again with sulphurous acid, and the solutions were concentrated and dialyzed through a Visking membrane toward distilled water containing 3-4% sulphurous acid.

The dialyzed calcium salt solutions were concentrated, and the product from I was isolated by dropping its solution in aqueous methanol into glacial acetic acid and that from II by adding its aqueous solution to dioxane. After two such precipitations, IA-1 was obtained as a light gray powder and IIA-1 as a brown product. IA-1 was reprecipitated from its aqueous methanol solution into dioxane. The products were analyzed, with the results shown in Table III.

The dialyzates (ID and IID) were concentrated *in vacuo*. The concentrated ID, from which calcium sulphite separated, was filtered and then added to a large volume of absolute methanol; a white precipitate was obtained. After one precipitation into glacial acetic acid and two further precipitations into absolute methanol, this product (ID-1) was analyzed (Table III). Product IID was not further investigated because of lack of time.

The solutions (I-sol. and II-sol.) containing the calcium hydroxide-soluble fractions were acidified with sulphurous acid and concentrated under reduced pressure. After filtration of the calcium sulphite, the solutions IB and IIB were made up to 1,000 ml.

A portion of each solution was dialyzed until the dialyzate did not leave any residue; the dialyzed solutions were evaporated to dryness, giving the residues IB-1 and IIB-1, which were analyzed (Table III).

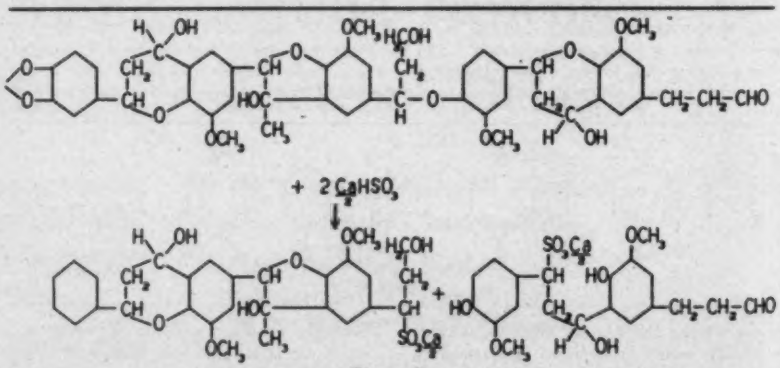

Figure 5

The major portion of I-sol. and II-sol. was treated with a solution of neutral lead acetate for removal of the sulphite and sulphate ions. The precipitates were filtered, washed and discarded. The dark-colored filtrates were then treated with basic lead acetate until further addition

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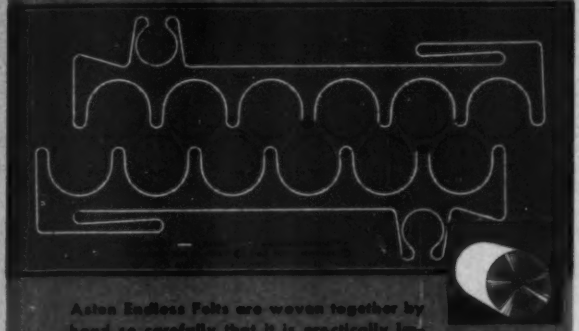

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did not cause the formation of a precipitate. The precipitates, which were pale yellow in the case of I-sol. and light brown in the case of II-sol., were filtered, thoroughly washed, and decomposed by passing sulphur dioxide into their aqueous suspensions until a *p*H of 2-3 was reached; this causes the dissolution of the lignosulphonic acid salt. A portion of the filtrates from the lead precipitates was evaporated to dryness; the low methoxyl content (calculated on the ash-free basis) indicated that only a minute amount of lignin material was left in the filtrates, which were therefore discarded. The solutions of the regenerated lignosulphonic acid salts were concentrated *in vacuo*. The salt IB-2 from I-sol. was isolated and purified by three precipitations of its aqueous methanol solution into glacial acetic acid and five precipitations into dioxane. The salt IIB-2 from II-sol. was purified by two precipitations into glacial acetic acid and two precipitations into dioxane. These products were also analyzed (Table III).

Table II shows that the lignosulphonic acids of the two cooks having the lowest sulphur content (IA-1 and IIA-1) are those which are precipitated by lime and are retained in the dialyzer, and may be a mixture of lignomono- and disulphonic acids. The lignosulphonic acid which passed the membrane (ID) had a sulphur content of 8.8%. Unless the lignosulphonic acid obtained by higher sulphonation (according to the structure shown in Figure 4) is likewise more ionized and approaches more and more a true solution with increasing sulphonation, the passage through the membrane can be explained only by the fact that the lignin is degraded and that small sulphonated fragments are formed which pass through the membrane. The lignosulphonic acids not precipitated by lime and not passing through the membrane (IB-1 and IIB-1) have high sulphur contents and may be mixtures of tri- and tetrasulphonic acids (Figure 4). Why they are not precipitated by lime cannot be decided without further investigation. The lignosulphonic acids not precipitated by lime but precipitated by basic lead acetate (IB-2 and IIB-2) have higher sulphur contents than the corresponding lignosulphonic acid precipitated by lime, but they do not pass through the membrane. On the other hand, IB-2 and IIB-2 have lower sulphur contents than the lignosulphonic acids (IB-1 and IIB-1) which are not precipitated by lime but are retained by the membrane. Because IB-1 and IIB-1 are isolated by dialysis of the filtrate obtained from the lime-water precipitate, whereas IB-2 and IIB-2 are precipitated from the same filtrate by basic lead acetate, it is obvious that a portion of the IB-2 and IIB-2 fractions must have passed through the membrane during dialysis. IB-2 and IIB-2 must, therefore, have a lower molecular size than IB-1 and IIB-1 with their higher sulphur content. From this, it must be concluded that IB-2 and IIB-2 may be lignosulphonic acids of sulphonated lignin fragments. [In a recent paper dealing with molecular weight determinations of lignosulphonic acid fractions, Schwabe and Hasner (*Cellulosechem.* 20:61-72, 1942) found molecular weights ranging between 300-400 and 20,000.]

Table III—Analysis of Lignosulphonic Acid Fractions

Designation of Lignosulphonic Acid Fraction	Methanol	Sulphur	Ash	Sulphur Calculated on the Ash-Free Basis*	Methoxyl Calculated on the SO and Ash-Free Basis**	Behavior on Dialysis
IA-1	13.6	4.9	1.65	4.95	15.5	Retained
IIA-1	11.1	5.4	8.2	5.5	13.2	Retained
ID-1	9.8	8.4	14.2	8.8	13.1	Passed
IB-1	10.4	7.5	17.5	7.8	13.6	Retained
IIB-1	9.5	10.0	19.5	10.6	13.1	Retained
IB-2	12.8	5.9	2.7	6.0	15.4	
IIB-2	12.5	9.1	2.3	9.25	16.5	

*Ash ignition factor = Ca/CaSO.

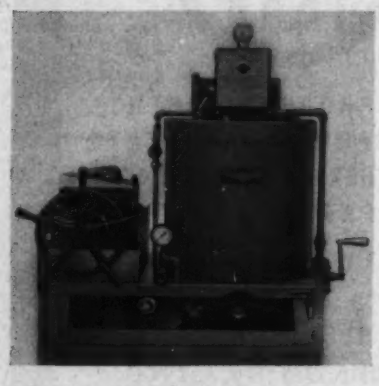
**Per cent CH_3O (as determined) × 100/100 — Per cent S × (SO_3/S) — ash × Ca/$CaSO_4$.

(Concluded on page 1046)

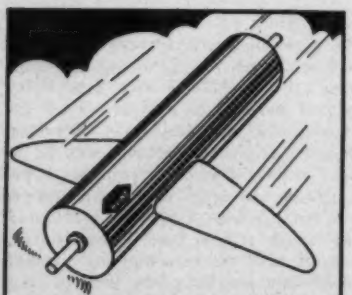
NEW EQUIPMENT AND SUPPLIES

Small Capacity Oil Reclaimer

A lubricating oil reclaimer, with a capacity for purifying eight gallons of dirty oil in 70 to 90 minutes, is being manufactured by the Youngstown Miller Company, Sandusky, Ohio. The machine has a two-



stage filter press, is semi-automatic, operating under thermostatic control, and utilizes common refinery earths. It is designed to restore used oils to substantially the same values of fire, flash, viscosity, color, neutralization number and precipitation number as the respective parent oils.



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Fire Shield

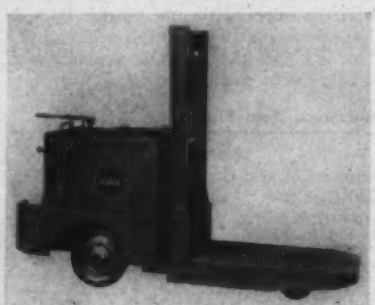
American-LaFrance-Foamite Corporation, Elmira, N. Y., has announced the *Foamite Fire Shield* for use in close-up fire fighting. Between the front and back plates of the shield, which is built of sheet steel, reinforced with angle irons, is a one-inch thick insulating mineral wool blanket, capable of withstanding a temperature of 1200 Fahr. The shield is provided with three observation ports and four nozzle ports, each equipped with a pivoted cover door controlled from the rear of the shield, and with anchoring chains for securing playpipes in place.

A full length handle bar extends the full width of the shield at the top. Two short handles, normally hanging down, may be used to maneuver the fire shield at the scene of a fire.

Other features of the shield include a wheel carriage which is bolted to the shield body, three skirts which are hinged at the base of the shield, and rear supports which are hinged to fold against the shield body. The shield is 79½ inches high by 75¾ inches wide overall.

3-Ton Electric Truck

A 6000-lb. capacity truck, combining self-loading and tiering features in a single unit, has been announced by the Baker Industrial Truck Division of The



Baker-Raulang Company, 2168 W. 25th St., Cleveland 13, Ohio. Designed for operation in intersecting aisles 67 in. wide, the truck is built on a 66 in. wheelbase. Its over-all length, including operator's guard, is 123¾ in. Its over-all height of 83 in. permits entrance into box cars for loading and provides a maximum lift of 67 in. The platform is 26½ in. wide, 54 in. long, and 11 in. high in the low position.

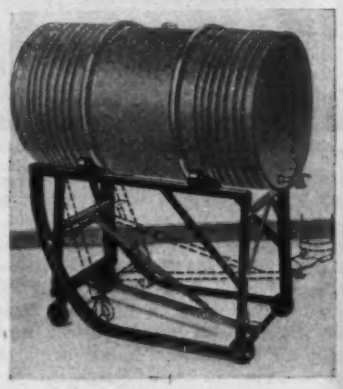
The battery box with a size of 32 in. by 39½ in. provides space for enough battery capacity so that under most conditions, there is no need to stop during a working shift to change batteries.

All controls, together with lift motor and pump, are in a convenient control panel and are readily accessible. The travel brake, located just below the control panel, is adjusted by a single hex nut which is out in the open where it can be readily reached.

Likewise included on the truck are a number of standard Baker features.

Drum and Barrel Safety Cradle

Industrial Products Company, 2820 N. Fourth St., Philadelphia 33, Pa., has announced a cradle for the safe and easy handling of drums and barrels. Rotating



wheels at top of the cradle frame allow for the quick-positioning of a drum or barrel for removing part or all of its contents. The cradle is strongly constructed and is equipped with heavy duty wheels and swivel casters.

Belting Resurfacer

So-Lo Works, Inc., Loveland, Ohio, has announced that Industrial So-Lo, a product for resurfacing rubber, rubber composition, leather and cotton belts, is now being made with synthetic rubber. The product consists of a cement primer and a mastic. In making an application, the belt surface is roughened, the primer applied, and then the mastic spread on. One quart covers approximately 14 square feet.

Other uses suggested by the manufacturer for the product includes: resurfacing metal, wood, and composition pulleys; insulator to cover switch handles and other electrical devices; nonslip for metal and concrete stair treads; and for repairing rubber boots and gloves.

It is available in outfit of quarts, gallons and 5-gallons.

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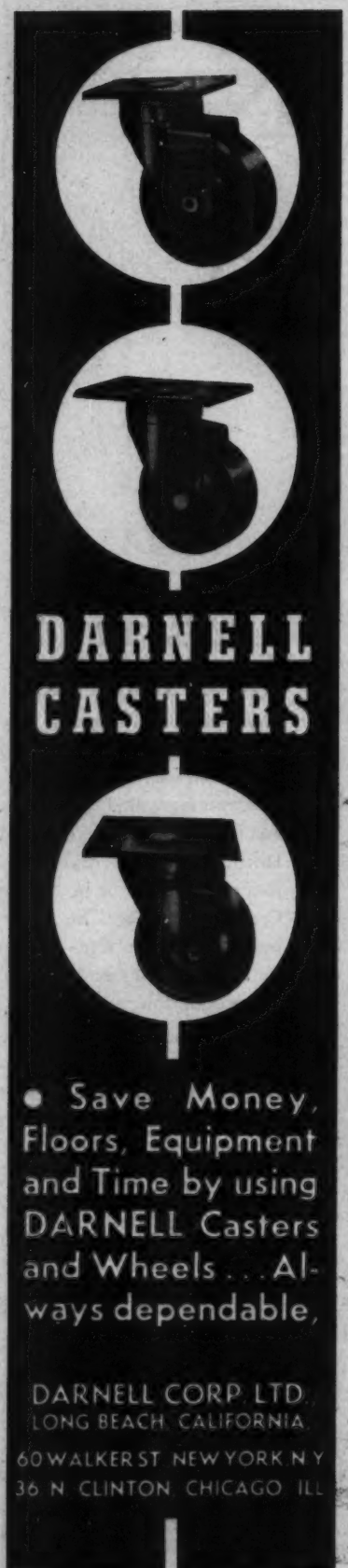
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Hollow-Shaft Synchronous Motor

General Electric Company, Schenectady, N. Y., has announced a vertical, high-speed, hollow-shaft, synchronous motor. Furnished in ratings from 100 to 1000 hp., the motor has a dripproof enclosure. The

top cover of the motor is easily removed. Access to the brushes and the collector rings is obtained by simply unlatching a flush-mounted steel plate. The motor can be furnished with a non-reverse ratchet to prevent reversal of rotation at shutdown or on starting.

New Synthetic Plastic

Resistoflex Corporation, Belleville, N. J., has announced a line of plastic materials under the designation of *Compar*, a name derived from letters in the words "Compounded Polyvinl Alcohol Resin."

The new plastic has pronounced flexibility, toughness and abrasion resistance. Some varieties will remain flexible at temperatures as low as 70 Fahr. or as high as 300 Fahr. Others have been so modified as to be insoluble in water at all temperatures, with swelling limited to 10 per cent and water absorption to about 15 per cent. De-

velopment work now in progress indicates the possibility of still further decreasing the water sensitivity of these compounds.

The outstanding characteristic of Compar is its inertness to organic solvents.

One of the major applications so far developed for Compar is in the construction of hose and hose assemblies. Washers, gaskets and seals for holding hard-to-handle solvents, aligning rings for the assembly of electronic devices, transmission rings for delicate driving mechanisms, and diaphragms of various kinds are only some of the shapes which have been developed.

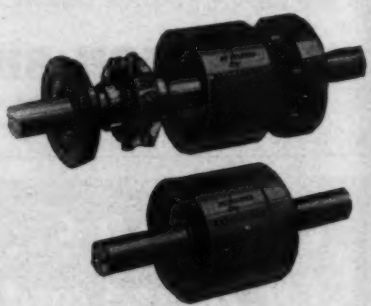
Compar also is available in solution form. One solution, when applied to the welts and uppers of industrial shoes, oil-proofs and solvent-proofs the shoes, thus protecting both the shoes and the worker's feet from these materials. Other solutions are available for coating wood, fabric and paper. One of the most interesting applications of Compar solution is as a paint to the inside of a wooden or composition board fumigating box or chamber to make such box entirely gasproof.

Hydrocarbon Cleaner

Technical Processes Division of Colonial Alloys Company, Colonial Philadelphia Building, Philadelphia 34, Pa., has announced RUNNING GEAR as a water-emulsifiable type cleaner for quick removal of oils and greases and other dirt from large machines and parts and assemblies, prior to repairs or refinishing.

Lubricated Centrifugal Clutch

The Amalgamated Engineering and Research Corp., 100 West Monroe St., Chicago 3, Ill., has announced an automatically engaging and self-disengaging centrifugal clutch. Known as *Torkontrol*, the unit consists of a partially filled oil chamber fitted with a freely rotating hub, which carries a series of movable wedge



shaped flyweights. As the hub revolves, the weights fly outward and engage the internal rims of the outer case, thus binding the hub and shell into a functionally solid pulley or coupling.

Working equally well in either direction, and set to engage or release at a given speed and to slip in case of overload, the device can serve either as a coupling between shafts, or as a driving pulley or gear in a transmission, as well as a starting cushion between power units and driven mechanisms.

The clutch has been built in sizes from ¼ hp. to 500 hp., and is built for both built-in and general application.

Oil and Grease Absorbent and Floor Cleaner

Fidelity Chemical Products Corp., 430 Riverside Ave., Newark, N. J., has announced an oil and grease absorbent and floor cleaner under the name *Absorbo*. Listed by the Underwriters' Laboratories, Inc., as a Class 1 non-combustible absorbent "for reducing fire and slipping hazards and for cleaning floors," the product, according to the manufacturer, is nonabrasive, odorless, nonpoisonous and noninjurious to skin, clothing or flooring. It is granular in form, and absorbs up to 45 to 50 per cent of oil or grease by weight.

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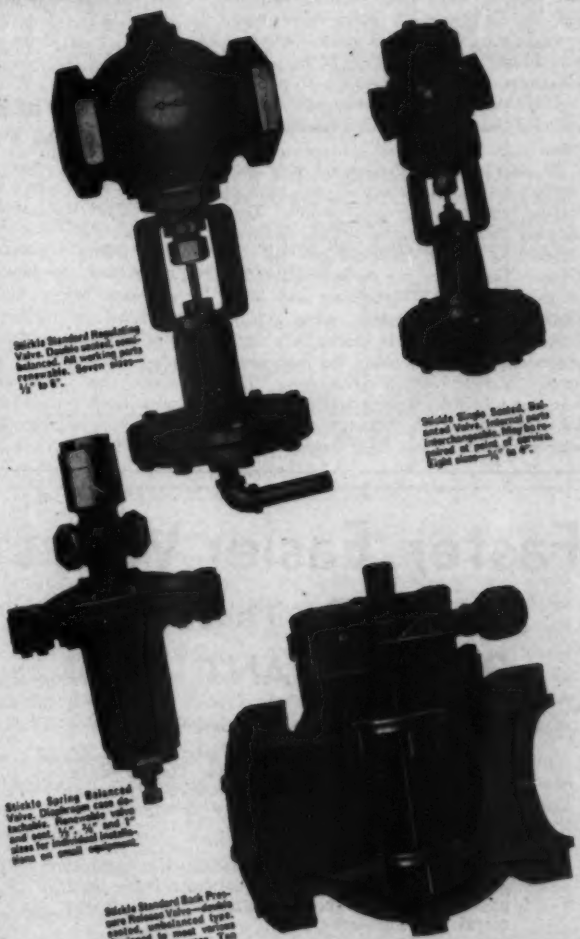

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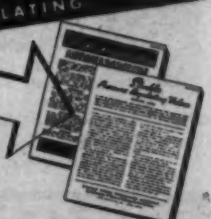

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TECHNICAL DEVELOPMENTS

These abstracts are of the latest developments found in the American and foreign press.

Stepwise Beating of Pulps

No significant strength changes were noted when pulps were beaten (a) uninterruptedly to a Schopper-Riegler degree of 83 or (b) in stages to the same degree. These results were obtained in a Jokro mill when unbleached and bleached sulphite and bleached sulphate pulps were used. It made no difference whether the pulps were beaten continuously or in five stages with intermediate 15 minute rest periods, provided the total time of actual beating and the final degree S.R. remained the same.

An experimental laboratory beater gave similar results, irrespective of whether beating pressures were high or low. Data showing breaking lengths, stretch, and time required to reach a definite degree S.R. are given. They show no marked differences in the two cases (continuous and interrupted beating). However, when a hard, unbleached sulphite was beaten in a semi-commercial bronze jordan, the interrupted beating showed certain advantages. This was true when the beating was mild in the initial stages and when the beating pressure was increased in the later stages. Under these conditions the stock showed longer fibers, a greatly improved breaking length, folding endurance and tear.

When the beating pressures were high at the beginning, and were decreased in the final stages, these advantages were lost. The fiber debris was greater, and the strength properties lessened. Tabulated data, graphs, and diagrams of the equipment used are given. W. Brecht and U. Strindlund. Wochbl. Papierfabr. 73, 321-5 (1942).

The Effect of Kollerganging on Various Pulps

The author used a kollergang, a full description of which is given in the article, and which was capable of handling 500-600 kg. of dry stock. The following pulps were studied: groundwood, bleached and unbleached sulphite pulps (beaten and unbeaten before kollerganging), sulphite (purified by further alkaline treatment), bleached and unbleached soda pulps, sulphite pulps from beech and aspen, and cotton rags. The periods of kollerganging were from zero to 2 hours. Usually two sets of kollergang experiments were made. In one, the stock retained about 75% water, and in the other the stock contained 66%. During the first half hour of kollerganging the temperature in the kollergang usually rose about 10 deg. C. and during most of the kollerganging periods the temperature range was 28-39 deg. C. Detailed tabulated data are given regarding power consumption and also absorptivity, breaking length, viscosity, and folding endurance of pulp sheets. Usually, the kollerganging did not change the deg. S.R. of the stock. When the stock contained large amounts of noncellulosic materials, kollerganging caused marked changes in stock properties. With unbleached sulphite, adsorptivity increased during the first hour and then dropped steadily. Breaking lengths decreased, as did the viscosity and the folding endurance (of pulp beaten prior to kollerganging). Bleached sulphite and unbleached soda pulps gave qualitatively similar (but less marked) results on kollerganging. Bleached soda pulp, however, remained almost unchanged with the exception of the breaking lengths, which showed a slight decrease. Rag stock remained practically unchanged. It appears, therefore, that kollerganging has little effect on fairly pure cellulose samples. The more water is present in the stock, the less are the changes noted after kollerganging. Fibrillation in general does not occur, although the microscope shows that fibers are cut in the kollergang. Kollerganging, the author feels, should be avoided excepting in special cases. Otto Wurz, Papier-Fabr. 41, 43-9 (1943).

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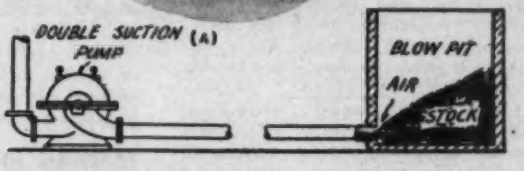
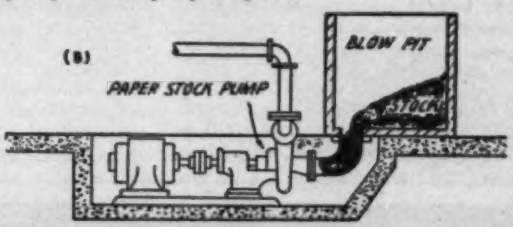
GOULDS PUMPS SOLVE A PAPER STOCK PUMPING PROBLEM

This original installation shows a double suction pump on blow pit service incorporating a long horizontal run of suction pipe, with the pump located 30 ft. from the chest.



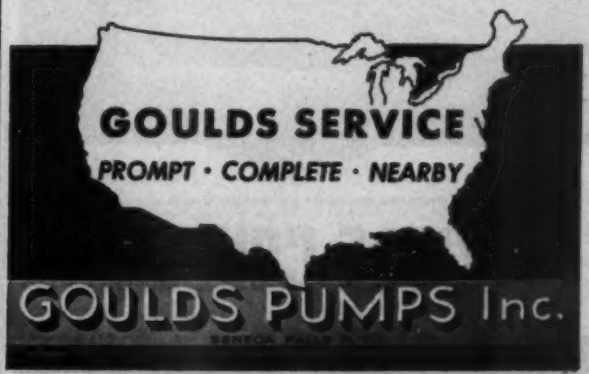
The outlet from the chest and pump were approximately at the same level, leaving little or no submergence when the stock level was low in the chest. When the pumping operation reached this point, air was drawn into the suction pipe and, collecting in the top of the suction pipe and pump casing, effectively air bound the pump. When this condition occurred, it was necessary to direct a large stream of water into the chest and raise its level to again permit the pump to operate.



This shows the method by which the trouble was corrected. A regular side suction type of paper stock pump was used, located in a pit below the bottom of the chest with a short and direct suction elbow from chest to pump. This paper stock pump was of the top horizontal discharge type and when this change was made the pump performed entirely satisfactorily and would pump the chest clear down to the bottom. Any air entering the suction pipe at low chest levels was easily discharged from the pump through the self-venting top horizontal discharge nozzle.

For 95 years, the Goulds organization has been building pumps. Through all these years, Goulds has met every problem of design and construction with a pump to do the job efficiently and economically.

You can obtain more details on the problem shown above, or on any pumping problem by sending it to Goulds for accurate recommendations.



PAPERMAKING PATENTS

IN THE UNITED STATES — Compiled by James Atkins, Registered Patent Attorney

Inquiries should be addressed to James Atkins, Munsey Building, Washington, D. C.

Treatment of Paper and the Like

Patent No. 2,309,090. Jordan V. Bauer, Elmwood Park, and Don M. Hawley, Geneva, Ill., assignors to Stein, Hall Manufacturing Company, Chicago, Ill., a corporation of Delaware. Application October 6, 1938. Serial No. 233,557. 7 Claims. (Cl. 117—155). A method of treating normally water permeable paper of relatively low wet strength in order to increase its wet strength without substantially decreasing its water absorptivity which comprises treating said paper in sheet form with a formaldehyde compound, urea and acid reacting catalytic substance capable of penetrating the paper rapidly, said materials all being added separately and uniformly to the paper in solution form, the urea being added to the opposite side of the paper from the formaldehyde compound, and then immediately winding said paper into a tight roll, said treatment and said winding being effected substantially without heating while maintaining a moisture content within the range of about 3% to about 10% by weight of the paper and employing resin-forming proportions of urea, formaldehyde and acid catalyst in amount to increase the dry weight of the paper within the range of about 2% to about 5%, said paper being characterized by the fact that the wet strength and resistance of the paper to tearing while wet are substantially increased after the paper has been allowed to stand in roll form for a substantial period of time without substantially decreasing the water absorptivity of the paper.

Method of and Apparatus for Controlling Digesters

Patent No. 2,310,415. Webster W. Frymoyer, Foxboro, Mass., assignor to The Foxboro Company, Foxboro, Mass., a corporation of Massachusetts. Application December 1, 1938. Serial No. 243,333. 18 Claims. (Cl. 92—7). Method of controlling the gas release from a pulp cooking digester, comprising continually releasing air from the vapor space of the digester in accordance with the difference between the total pressure in the digester and the vapor pressure of water at the initial condensing temperature of the gases in said vapor space.

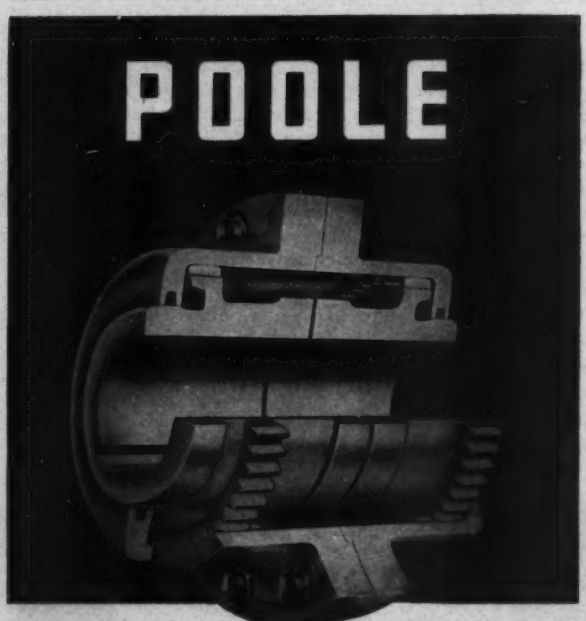
An apparatus for controlling the removal of non-aqueous gases from the vapor space of a digester through a pressure relief line, the combination of, a condensing chamber connected to the said relief line means responsive to the temperature within the said condensing chamber, means responsive to the pressure in the said relief line, means for continuously subtracting the position of the said temperature-responsive means from the position of said pressure-responsive means to obtain a difference, and means for regulating the flow of vapors through said relief line in response to variations in the value of said difference.

◆

The Nature of Lignosulphonic Acids . . .

(Continued from page 1039)

It should be emphasized that this was an attempt to attack the problem outlined above. Certain results have been obtained, but much remains to be done. For instance, the isolation and further purification are not satisfactory. The precipitation (e.g., of the lignosulphonates into glacial acetic acid) is unsatisfactory because it apparently gives some free lignosulphonic acid, as indicated by the low ash content (IA-1, IB-2, and IIB-2) in comparison with the sulphur content. This is further shown by the fact that, on drying, the products become partially insoluble in water; this may also account for the high methoxyl content of the products after their precipitation into methanol. This work will be continued as time permits.



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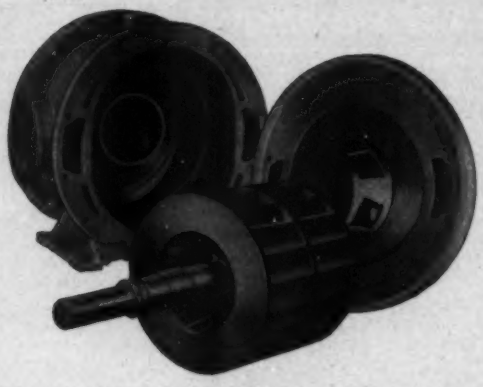

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IN CANADA—ROSS ENGINEERING OF CANADA LTD., DOMINION SQUARE BLDG., MONTREAL, QUE.

New Catalogues and Publications

American Manganese Steel Division, Chicago Heights, Illinois—Two bulletins recently issued are filled with information regarding the chemical and physical properties of this company's manganese steel "The Toughest Steel Known." Bulletin 1043-CM shows special applications of the steel for cement mill equipment, while bulletin 943-R takes up railroad industry applications. They are well illustrated and contain interesting and valuable data.

Copper & Brass Research Ass'n, 420 Lexington Ave., New York, N. Y.—Because its consumers have requested authoritative information on the subject, this organization has prepared and just released a "Pipe & Tube Bending Handbook." This book is a complete treatise showing methods and devices for bending pipes and tubes of copper and its alloys. There are 80 pages in the book, with 113 figures and illustrations including 35 full pages of unit weights of tubes of different alloys with varying diameters, wall thicknesses and shapes. Those interested in this work may request copies.

Fairbanks, Morse & Co., Chicago, Ill.—Bulletin 5460-1 shows construction features and dimensions of this company's paper stock pumps. Cross section drawings show the design and construction of both the open impeller and closed impeller types.

Falk Corporation, Milwaukee, Wis.—Bulletin 3100 is a revised edition of No. 273, Falk Motoreducers. This 64-page bulletin is a helpful reference for industrial engineers, designers and purchasers of machinery, as it is set up in conformance with Standard Practice of the American Gear Manufacturers Association. It has been prepared to simplify the selection of correct gearmotor units for specific applications. Copies gratis.

Leeds & Northrup Company, Philadelphia 44, Pa.—This company's general catalogue N-96(1) on Micromax pH Recorders is of timely interest to paper mill men. The principle and design of Micromax indicating recorders are covered and the booklet is graphically illustrated. Copies on request.

Link-Belt Company, Chicago 8, Ill.—A 16-page illustrated booklet, No. 1992 on self-contained electric car spotters has just been published by this company. There are blueprints, illustrations and specifications on these spotters, and two pages of illustrations showing applications and uses in various industries. Copies gratis.

New York Belting & Packing Co., Passaic, New Jersey—"Facts About Synthetic Rubber" is the title of a new booklet just released by this company. Copies from the company or its distributors.

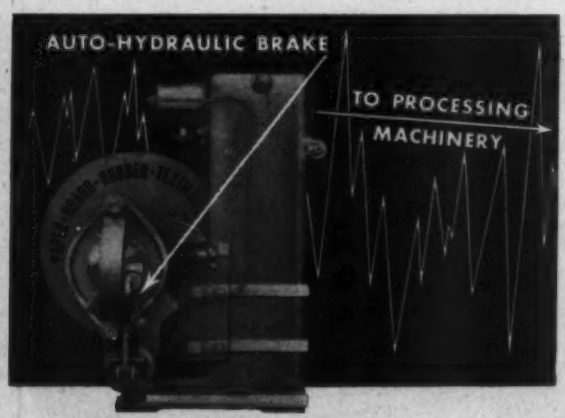
Swenson Evaporator Co. Div., Harvey, Ill.—Just off the press is bulletin F-103, covering the Swenson-LeVal line of clarification filters. The LeVal type filter is used by beverage manufacturers and is also applicable to numerous filtration operations in the chemical process field. Copies from the company.

Towmotor Corp., Cleveland 10, Ohio—Many special "tricks" in operating Towmotor lift trucks, as well as valuable information to both new and inexperienced lift truck operators are contained in the new publication "Lift Truck Operators Guide." The company has prepared this booklet for the purpose of increasing the skill of operators in line with today's higher production goals. There is a check list of what to do or not to do in safe performance, also instructions covering the operating care of lift trucks. The guide is available in two forms—one condensed form may be had from which specific Towmotor operating instructions have been omitted. Copies on request.

Wheelco Instruments Co., Chicago 7, Ill.—A new bulletin A2-3 contains descriptive information about the Wheelco Potentiotrol. The potentiometer method of heat measurement and the electronic principle employed in the company's instruments are explained. There is a list of instrument features, operating diagrams, tables, and data. Copies on request.

Westinghouse Elec. & Mfg. Co., East Pittsburgh, Pa.—A pictorial wall chart illustrating the "Causes and Cures of 14 Common Welding Troubles" has just been received from this company. The "trouble," the "cause," and the "cure" are set in parallel columns. The trouble is illustrated with explanatory cause and cure opposite.

Yale and Towne Mfg. Co., Philadelphia, Pa.—A 76-page war model catalogue contains detailed descriptions of all models, as well as a great many application illustrations showing many uses of industrial power trucks. A separate section is devoted to the workings of the WPB Limitation Order No. L-112 as applied to Yale Industrial Trucks. Copies on request.



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Used in **converting, waxing, coating, embossing, printing, etc.**

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Labor and time-saving always result, and increased production, improved quality and less spoilage almost invariably result, when the Johnstone Uniform Tension Unwinder is installed. The machine operator need no longer be constantly on the alert to apply or release the hand brake controlling the speed of the unwinding roll. The "Tensioneer" of this machine practically "thinks for itself" in actuating the Auto-Hydraulic Brake. Once the machine tension is set, by adding or removing weights, the operator can forget all about tension, even in starting, stopping or jogging starts. This "pull-balancing" automation maintains the web tension uniform whether the roll speed is 15 F.P.M. or 1500 F.P.M., sometimes even at 2000 F.P.M., regardless of the diameter of the roll.

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A mill owner using silicate for 30 years says: "...the percentage of pop-test readings to basis weight is considered to be increased by an average of five points.....Occasionally a paper may run too low in strength and an increase of silicate alone in the furnish will raise the test one or two pounds or even more."

We'd like to send you more information on this and other advantages of PQ Silicate in the paper beater.

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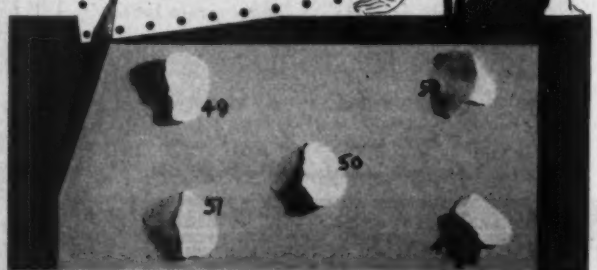
Philadelphia Quartz Company, Manufacturer

125 South Third Street, Philadelphia, Pa.

Distributors' Stocks in 65 Cities



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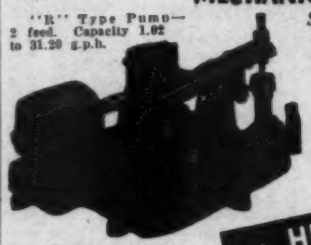
"R" Type Pump—2 feed. Capacity 1.02 to 31.20 g.p.h.



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It is amazing what a difference these Hills-McCanna Proportioning Pumps can make in production economy, where it is necessary to feed and inject various fluids in paper manufacture. They operate round the clock, if necessary, with mechanical regularity and a high degree of accuracy—requiring practically no attention or maintenance—saving hours and dollars of labor and expense—savings that show up prominently in daily mill records. Pumps are built on the Hills-McCanna pioneered single-plunger principle—rugged and long-lasting. Available in 8 types—200 sizes.

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Books

Industrial Safety—This book is written by several authors—men who know their subject: T. O. Armstrong, manager Industrial Relations, Westinghouse Electric & Mfg. Co.; Roland P. Blake, senior safety engineer, Division of Labor Standards, U. S. Department of Labor; J. J. Bloomfield, sanitary engineer, U. S. Public Health Service; C. B. Boulet, director of personnel, Wisconsin Public Service Corp.; M. A. Gimbel, safety engineer, General Electric Co. (Philadelphia Wks.); S. W. Homan, safety engineer Children's Bureau, U. S. Department of Labor; W. Dean Keefer, second vice president, Lumbermen's Mutual Casualty Co. (Mr. Keefer was formerly on the staff of the National Safety Council); and R. T. Page, assistant sanitary engineer, U. S. Public Health Service. The work was edited by Roland P. Blake, and the Foreword is by Henry T. Heald, president, Illinois Institute of Technology. Really a textbook on the subject, the thirty-one chapters of this book cover practically every phase of industrial safety, as well as statistics, tables, data and causes of all types of industrial accidents. Such subjects as Job Analysis, Plant Inspection, Plant Housekeeping, Maintenance and Guarding are treated with respect to their relation to accident prevention. The text is clarified by a large number of drawings and illustrations. The book may be obtained from Prentice-Hall, Inc., 70 Fifth Avenue, New York City. The price is $5.00.

The Paper Makers' Directory of All Nations (1943).—In its 52nd annual issue, this book contains pertinent data on the principal paper, pulp and board mills of the world. The listings of mills of the British Isles (England and Wales, Ireland and Scotland) appears in the early part of the volume.

Listing of mills in foreign countries and in the British Dominions and colonies follow. These listings are arranged alphabetically both by country and by firm name—the countries beginning with Algeria and ending with Yugoslavia. In addition to mill listings, there is much other directory information of importance: such as, Agents and Mill Representatives in England, Ireland and Scotland; British Paper Trade Associations; Equivalent Weights of British Printing Papers; Equivalent Weights and Sizes of British Writing Papers; British Paper Merchants; Wholesale Stationers, etc.; and much other information of related interest.

The publication office of the Directory is 30, Bedford St., Strand, London, W. C. 2, England; the price of the book 25/ net.

Standards of Tubular Exchanger Manufacturers Association—This paper-covered brochure of approximately 50 pages, punched for a standard three-ring binder, contains the recommended standards of the Tubular Exchanger Manufacturers Association for the mechanical and thermal design and construction of cylindrical shell and bare tube heat exchangers. Its contents include information on nomenclature, general standards, mechanical standards, flange design, material standards, thermal standards, fouling factors and thermal design data. The brochure also contains extensive design data in the form of graphic presentations. The price of the brochure is $2.00 a copy; the publisher, Tubular Exchanger Manufacturers Association, Inc., 366 Madison Avenue, New York 17, New York.

Steel Products Manual (Packaging, Marking and Loading Methods for Steel Products for Overseas Shipments).—This manual contains instructions which have been approved by the Army Service Forces, the Navy Department and the U. S. Treasury, Procurement Division, for wrapping, tying, boxing, marking and loading various steel products. The standard packages described in the manual have been designed to protect steel products during shipment to any part of the world.

Paper is one of three most commonly used packaging materials, the other two being steel and wood. In addition, many of the more highly finished products (such as wire, cold finished bars, cold rolled sheets and cold rolled strip) are protected against rusting caused by atmospheric conditions by coatings of special rust-inhibiting oils and greases.

As illustrated, paper-covered volume, the manual, published by American Iron and Steel Institute, 350 Fifth Avenue, New York, New York, is priced at $2.50 a copy.

Technical Report Writing—Written jointly by Fred H. Rhodes, Professor of Chemical Engineering, and Herbert Fisk Johnson, Professor of Industrial Chemistry, both of Cornell University, this volume deals with such subjects as: Importance of Effective Presentation in Technical Reports; Characteristics of a Good Report; Organization of a Technical Report; The Laboratory Notebook; Form of a Report; Styles, Conventions, and Correct Usage; and Oral Presentation of Technical Reports. The last chapters of the book touch upon some of the simpler methods of analyzing, correlating and depicting experimental data. It is a book of 125 pages. The page size is 6 in. by 9 in. Bound attractively and durably in a stiff cloth cover, the book is priced at $1.50 a copy by McGraw-Hill Book Co., Inc., 330 West 42nd Street, New York 18, New York.

CURRENT MARKET QUOTATIONS

RAGS (Domestic)

NEW RAGS — *per cwt.*

OPA ceiling prices in sales to consuming mills delivered buyer's usual receiving point, with brokers' allowance not in excess of 5 per cent.

Blue Overalls	-5.50
Corduroy, Men's	-3.50
Corduroy, Ladies'	-3.00
Washables, No. 1	-3.00
Percales	-4.75
New Soft Blacks	-3.75
Light Prints, No. 1	-4.50
Khaki Cuttings—	
Bleachable	-4.25
Unbleachable	-3.50
New White Canvas	-6.50
New Mixed Blacks	-3.25
Canton Flannels, Bleached	-7.00
Shirt Cuttings—	
New White No. 1	-7.25
No. 1 White Headings	-7.25
White Shrunk	-5.00
Silesias No. 1	-5.75
New Unbleached	-7.50
Fancy	-3.50
Linen Cuttings—	
American	-5.00
White	-14.00
Grey	-14.00

RAGS (Domestic)

f. o. b. New York City

OLD RAGS

OPA ceiling prices in sales to consuming mills f. o. b. cars at points of shipment, with brokers' allowances of $1 to $2 a ton depending on the value of the grade involved.

	per ton
Roofing—	
No. 1	31.00
No. 2	29.00
No. 3 and No. 4	27.00
Twos and Blues—	
Repacked	44.00
Thirds and Blues—	
Repacked	44.00
Miscellaneous	36.00
Whites, No. 1—	
Repacked	76.00
Miscellaneous	64.00
Whites, No. 2—	
Repacked	58.00
Miscellaneous	53.00

RAGS (Foreign)

ex dock New York City

NEW RAGS — *per cwt.*

New Dark Cuttings	Nominal
New Mixed Cuttings	
New Light Silesias	
Light Flannelettes	
Unbleached Cuttings	
New White Cuttings	
New Light Oxfords	
New Light Prints	

RAGS (Foreign)

ex dock New York City

OLD RAGS — *per cwt.*

No. 1 White Linens	Nominal
No. 2 White Linens	
No. 3 White Linens	
No. 4 White Linens	
No. 1 White Cottons	
No. 2 White Cottons	
No. 3 White Cottons	
No. 4 White Cottons	
Extra Light Prints	
Ord. Light Prints	
Med. Light Prints	
Dutch Blue Cottons	
French Blue Cottons	
French Blue Linens	
Checks and Blues	
Linsey Garments	
Dark Cottons	
Old Shoppers	

ROPE and BAGGING

f. o. b. and ex dock New York City

	per cwt.
Gunny No. 1—	
Foreign	Nominal
Domestic	3.25 to 3.50
Wool Tares—	
Light	3.50 to 3.75
Heavy	3.75 to 4.00
No. 1 Scrap Bagging	3.00 to 3.25
Manila Rope—	
No. 1 large	-*115.00
No. 1 small	-*105.00
Sisal Rope—	
No. 1 large	-*95.00
No. 1 small	-*85.00
New Burlap Cuttings	5.50 to 5.75
Jute Threads—	
Foreign (Nom.)	6.25 to 6.75
Domestic	5.50 to 6.00
Strings—	
No. 1 sisal	-*80.00
No. 2 sisal	-*60.00
Soft Jute	5.25 to 5.50
Mixed	1.50 to 1.75

*OPA ceiling price per ton f. o. b. shipping point.

WASTE PAPER

OPA ceiling prices f. o. b. points of shipment, with brokers' allowance of 4 to 9 per cent.

	per ton
Shavings—	
White Env. Cuts, One-Cut	67.50-
Hard White Env. Cuts	62.50-
Hard White, Unruled	57.50-
Soft White, One-Cut	57.50-
Soft White, Misc.	43.00-
Fly Leaf, No. 1	33.50-
Fly Leaf, Woody, No. 1	25.00-
No. 2 Mixed Col. Woody	18.00-
Flat Stock—	
Repacked No. 1 Heavy Books and Magazines	33.50-
Mixed Books	17.00-
Ledger Stock—	
No. 1 White	43.50-
No. 1 Mixed (Colored)	37.50-
Manilas—	
New Env. Cuttings	53.00-
New Env. Cuts, One-Cut	57.50-
Extra Manilas	37.00-
Manila Tab Cards, Free of Ground Wood	45.00-
Ground Wood Manila Tab Cards	27.00-
Kraft—	
Envelope Cuttings	65.00-
Mixed Env. or Bag Cuts	55.00-
Tripled Sorted No. 1 Brown	50.00-
New 100% Cor. Cuts	45.00-
No. 1 Old Assorted	35.00-
News—	
White Blank	33.00-
Overissue	17.00-
No. 1 Baled	15.00-
Old Corrugated Containers	23.00
New Corrugated Cuts	18.00-
Mill Wrappers	17.00-
Box Board Chips	14.50-
No. 1 Mixed Paper	14.00-

CHEMICALS

f. o. b. shipping point

Alum (Papermakers)—	
Lump, cwt.	4.25-
Ground, cwt.	4.00-
Powdered, cwt.	4.40-
Blanc Fixe—	
Pulp, bulk, ton	40.00 to 46.50
Dry, barrels, pound	60.00 to -
Bleaching Powder—	
Drums, cwt.	2.25 to 3.10
Cassin (Domestic Standard)—	
20-30 mesh (bags), lb.	24.00 to 24.75
80-100 mesh (bags), lb.	—
Argentine, lb.	—
China Clay—	
Domestic Filler	
Bulk (mine) ton	7.50 to 15.00
Domestic Coating	
Bulk (mine) ton	12.00 to 22.00
Imported (ship side)	
Bulk (lump) ton	15.00 to 26.00
Chlorine—	
Tank cars (wks) cwt.	2.00 to 2.25
Gelatine (silicin), lb.	.90 to .95
Glyc. (C.P.) drums, lb.	18.25 to 18.50
Litharge, powd., bbl., lb.	.09 to -
Rosin (Gum)—	
New York, per 100 lbs.	
E	4.70-
F	4.70-
G	4.74-
WW	7.75-
Rosin (Wood), carlots	3.64-
Salt Cake—	
Dom. bulk (wks) ton	15.00 to 16.00
Imp. bulks on dock— (Atl. ports) ton (Nom.)	20.00 to
Soda Ash—	
Bulk (works), cwt.	.90 to .95
Paper Bags, cwt.	1.05 to 1.35
Barrels, cwt.	1.05 to 1.35
Soda (Caustic)—	
Solid, drums, cwt.	2.30 -
Ground and flake, drums, cwt.	2.70 -
Sodium Silicate—	
60 deg., 55 gal. drums, (works) cwt.	1.65 to 2.05
40 deg., 35 gal. drums, (works) cwt.	.80 to 1.45
Starch—	
Pearl, 140 lb. bags, cwt.	3.10-
Pearl, barrels, cwt.	3.20-
Paper (Sp.) bags, cwt.	3.20-
barrels, cwt.	3.30-
Sulphur (crude)—	
(mine) bulk, long ton	16.00 to 20.50
Talc—	
Dom. 100 lb. bags (mine) ton	16.00 to 21.00
Imp. bulk, ton (Nom.)	—
Titanium Dioxide—	
Barium Pig., bbls., lb.	.05¾ to .06
Calcium Pig., bbls., lb.	.05 to .05¼
Zinc Sulphide, bbls., lb.	5.60 to 5.85

WOOD PULP

OPA maximum prices applicable to wood pulp delivered to consumer mills located East of the Continental Divide exclusive of Denver, Colo.:

Bleached softwood sulphite	76.00
Unbleached softwood sulphite	66.00
Bleached hardwood sulphite	73.50
Unbleached hardwood sulphite	63.50
Bleached Mitscherlich sulphite	81.00
Unbleached Mitscherlich sulphite	72.00
Northern bleached sulphate	86.00
Southern bleached sulphate	79.00
Northern semi-bleached sulphate	82.00
Southern semi-bleached sulphate	75.00
Standard news print siderums	46.00
Northern unbleached sulphate	73.00
Southern unbleached sulphate	63.50
Bleached soda pulp	66.00
Unbleached soda pulp	62.00
Ground wood pulp	46.00
Sulphite screenings	38.50
Sulphate screenings	38.00
Ground wood screenings	30.00
Northern unbleached sulphate siderums	73.00
Southern unbleached sulphate siderums	63.50

PAPER

f. o. b. New York City

	per ton
Boards—	
Binders	84.00-
Chip	48.00-
Chip, sgl. mla. lined	60.00-
Coated, white patent .016	80.00-
.020 and heavier	75.00-
Kraft liner	63.00-
News	45.00-

Book Papers—OPA base maximum prices per cwt. 4 cases or equivalent, f. o. b. mill with quantity, weight, manufacturing and other differentials allowed:

Uncoated (Untrimmed)	
Book, White (M. F.)—	
A Grade E. F.	8.25
B Grade E. F.	7.80
C Grade E. F.	7.55
D Grade E. F.	7.30
E Grade E. F.	7.05
No. 2 Uncoated Offset 4 sides. White	8.45
Coated White (Trimmed 4 sides)	
No. 1 Glossy	11.90
No. 2 Glossy	10.85
No. 3 Glossy	10.15
No. 4 Glossy	9.80
No. 5 Glossy	9.30
C2S Offset	10.40
C1S Litho (Varnish)	10.05
C1S Litho (Non-Varnish)	9.80

Writing Papers—OPA base maximum prices per cwt. on writing papers, f. o. b. mill with zone, quantity, packing and other differentials allowed:

	per cwt. 20 lb.	16 lb.
Rag Content Bond—		
Extra 100% Rag	34.00	34.00
100% Rag	28.00	28.00
75% Rag	20.00	20.00
50% Rag	16.00	17.25
25% Rag	14.00	15.00

	per cwt. Zone 1
Rag Content Ledger—	
Extra 100% Rag	35.00
100% Rag	29.00
85% Rag	26.00
75% Rag	21.00
50% Rag	17.00
25% Rag	15.00

	per cwt. 20 lb.	16 lb.
Sulphite Bond—		
Air dry, watermarked	12.75	13.70
No. 1 (M. F.) watermarked	9.00	9.70
No. 2 (M. F.) watermarked	8.25	8.85
Plain (M. F.) unwatermarked	7.60	8.20

	per cwt. Zone 1
Sulphite Ledger—	
No. 1 (M. F.) watermarked	10.00
No. 2 (M. F.) watermarked	9.25
Plain (M. F.) unwatermarked	8.60

	per cwt.
Glassine (f. o. b. mill)—	
Embossed (25 lb. up)	13.75 to 14.25
Bleached (25 lb. up)	12.75 to 13.25
Unbleach. (25 lb. up)	11.50 to 12.00
Greaseproof—	
Bleach. (25 lb. up)	11.00 to 11.50
Unbleach. (25 lb. up)	10.00 to 10.50

	per ton
News—OPA Ceilings	
Rolls (Contract)	58.00
Rolls (Spot)	(nominal)
Sheets	66.00

	per ream
Tissues (Carlots)—	
White, No. 1	1.12½ to 1.20
White, No. 2	1.00-
Bleached Anti-Tarnish	1.15-
Colored	—
Anti-Tarnish Kraft	.70-
Manila	.90 to .95
Napkins, semi-crepe (12½ lb. to M shts.) per cs.	.60-
Napkins, full crepe and emb'sed (12½ lb. to M shts.) per cs.	.60-
Toilet, Bleached (M shts.) per cs.	5.65-
Toilet, Unbleached (M shts.) per cs.	4.25-

	per case
Towels—	
Bleached	3.20 to 3.75
Unbleached	2.60 to 3.05

	per cwt.
Wrappings (Kraft)—	
Super-Standard	5.25-
No. 1 Wrapping	5.00-
Standard Wrapping	4.75-
Standard Bag	4.37½-

	per cwt.
Wrappings (Sulphite and Bleached Kraft)— (Rolls, f. o. b. mill)	
Bleached papers—	
M.F. & M.G. Waxing, 20 lb. (Carloads only)	7.25 to 7.50
(10,000 lbs.)	7.50 to 7.75
Drug wrapp. 35 lb.	7.00 to 7.25
Unbleached Papers—	
Com. Grd. Butch. 40 lb.	5.50 to 5.75
No. 1 Butchers	5.75 to 6.00
No. 1 Imit. Parch & Dry Fin. Groc. Sulphite 30 lb.	6.25 to 6.50
No. 2 Imit. Parch & Dry Fin. Groc. Sulphite 30 lb.	6.00 to 6.25
Steam Finish, 50 lb.	5.00 to 5.25
Water Finish, 40 lb.	5.50 to 5.75

Manilas—	
Envp. Mla., Sub. 16-40 (No. 1)	6.00 to 6.50
Envp. Mla., Sub. 16-28 (No. 2)	5.75 to 6.00
Envp. Mla. (Prices based on large sheets untrim'd reammarked, in bdls.)	
Wrapp. Mla. 35 lb. up—	
No. 1	6.00 to 6.25
No. 2	5.75 to 6.00
M. G. Sulphite and Kraft (other than Waxing)	
Grade A-22 lb.	7.20 to 7.40
Grade B-30 lb.	6.75 to 7.00

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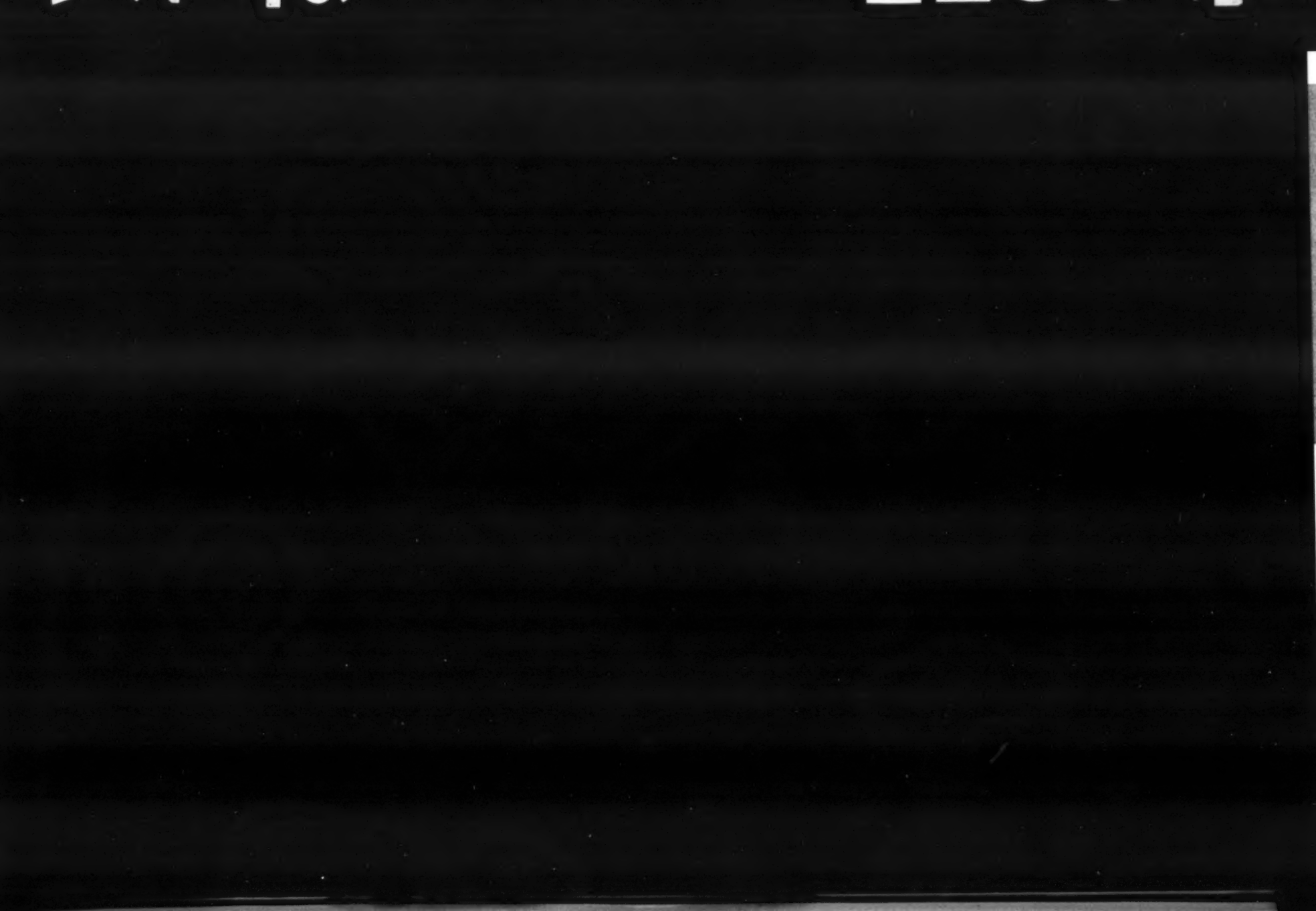

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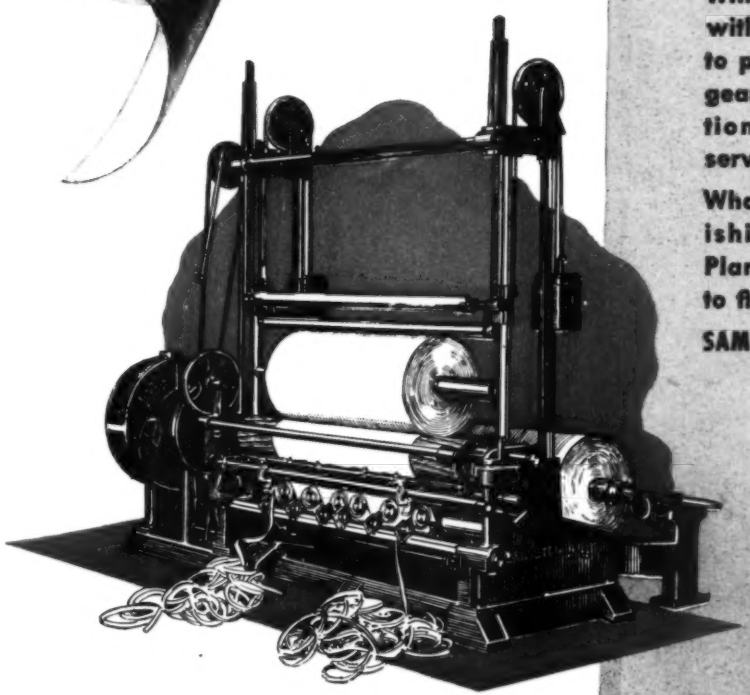

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